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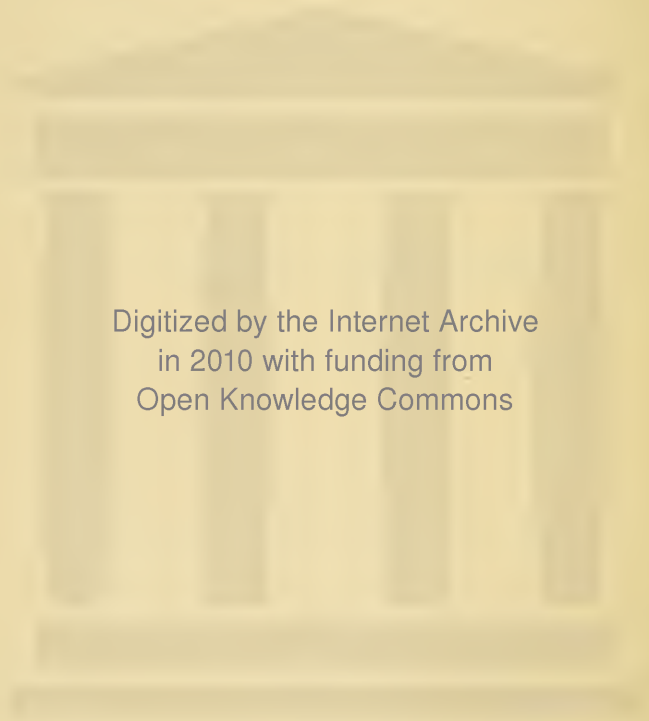
AND
HEALTH RESORTS OF EUROPE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THE MINERAL WATERS

AND

HEALTH RESORTS OF EUROPE

TREATMENT OF CHRONIC DISEASES BY SPAS AND CLIMATES
WITH HINTS AS TO THE SIMULTANEOUS EMPLOYMENT
OF VARIOUS PHYSICAL AND DIETETIC
METHODS

BEING A REVISED AND ENLARGED EDITION OF

'THE SPAS AND MINERAL WATERS OF EUROPE'

BY

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WITH A MAP

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PREFACE

In the present edition every page has been carefully revised; great alterations have been made, and much new matter, which it is believed may be useful, has been interpolated; two fresh chapters (Chapters XVIII. and XIX.) have likewise been added. The previous arrangement of the subject and the methods of classification adopted in the first edition have, however, in the main been adhered to.

As much of the effect of mineral water treatment (balneo-therapeutics) cannot be separated from the effect of the external or internal use of plain water (hydro-therapeutics), the first chapter is devoted to a short consideration of hydro-therapeutics in general. Chapters II. and III. deal with the classification and action on the body of mineral waters. In the fourth chapter climate, diet, and altered mode of life are considered, as regards their share in the results obtained by spa treatment; massage and muscular exercises at spas are likewise noticed. The subjects of medical supervision, the 'after-cure,' &c., are dealt with in the fifth chapter. The next eleven chapters are given up to the uses of the different classes of waters and to notices of the different spas. Marine and inland health resorts are considered in Chapters XVII. and XVIII. The next chapter gives a short

account of 'grape-cures,' dietetic cures, and sanatoria for special methods of treatment. In the remaining two chapters an attempt is made to indicate which mineral waters, health resorts, and localities for after-cure are likely to prove useful in various diseases and morbid conditions. The dietetic management of patients, and various physical methods of treatment, such as exercises and massage, are likewise necessarily alluded to in Chapter XX.

In describing the individual spas and mineral waters there has been necessarily a good deal of repetition, which, however, it is hoped may be found of use by those who chance to consult the book for information concerning some particular spa only. For purposes of reference also, a number of spas (some merely of local importance) have been mentioned, though they are hardly likely to be known or visited by English medical men or patients. In the present, as in the first, edition the various spas have been described in groups according to the main position they occupy in the classification which we have adopted. The thick figures made use of in the index for the main references will, we trust, prevent loss of time in reference, but in another edition, should there be one, we shall perhaps merely name the chief health resorts where we have described them in the present edition, and then give their actual descriptions in alphabetical order in a separate part of the book—an arrangement which obviates the necessary imperfections of all methods of classification, and which does not require the frequent use of cross references from one group of spas to another.

In the arrangement of spas of any one group, the method ordinarily followed has been to give at first somewhat detailed notes of a few of the better known

members of the group, and then, in proceeding with the other members, to follow the political geographical order of Great Britain, Belgium and Holland, Germany, Austria, Switzerland, France, Italy, &c. Thus in the chapter on the simple thermal waters, Wildbad and Ragatz-Pfaefers have been taken as types of the group, and somewhat detailed accounts have been given of these two spas. The other members of the group have then been described at less detail in their political geographical order. Similarly, in the chapter on chalybeate waters, descriptions of Spa, Schwalbach, and St. Moritz have been given at first; in the chapter on simple alkaline waters Vichy and Vals have been described first; in the muriated alkaline group Ems and Royat have the first places; and the earthy waters are headed by Wildungen and Contrexéville.

The most useful works of reference on the subject have been mentioned in the Bibliography at the end of the book, and it will be seen that a considerable number of books and articles (chiefly recent ones) have been added since the first edition. The list has still no pretensions to be anything like a complete one of the immense amount of literature which has been published even in quite modern times on balneological and climatological subjects. It comprises, however, most of the more valuable works, and all the books from which the authors have derived most help. Amongst these must especially be mentioned the text-books and writings of Durand-Fardel, Seegen, Braun, Valentiner, Burney Yeo, Macpherson, De la Harpe, Gsell-Fels, Vintras, Senator, E. H. Kisch, P. Schivardi, K. Grube, H. Reimer, and R. Flechsig.

A great number of the more important spas have been specially visited by one or both of the authors in

order that the descriptions given may be as accurate as possible, and this opportunity is taken to thank doctors at the spas visited, for the great kindness they have shown in furnishing local information and the means of obtaining it. The book is, however, not intended to replace any of those useful works which are devoted chiefly to questions of travelling, hotel accommodation, objects of interest in the neighbourhood, &c. These important subjects have hardly been touched on, but in the present edition a map of health resorts has been added, which will give an idea of the position of the different places mentioned in the text. The index to the map is included in the general index.

Owing to the variety of our sources of information, and the occasional contradictory results of different analyses,[1] we are fully aware that in quoting the approximate amount of ingredients in mineral waters some inaccuracies[2] must have crept in; we believe, however, that the figures will on the whole be found useful. It

[1] The variations which occur naturally in the constitution of mineral springs (from which surface water is kept out) appear to be usually only very slight. Analysis of the deposit found in pipes which supplied the ancient Roman *Thermæ* at Bath shows that the relative proportion in the solid constituents of the Bath water must have remained unchanged from Roman times till now (see Kerr, *Bath Waters*, 7th ed., p. 64). R. Fresenius (*Veröffentl. d. Allg. deutsch. Bäder Verbandes*, 1894, p. 116) shows that slight quantitative variations in the constitution of some German mineral waters do probably take place, and that these variations are less in thermal springs, such as the Wiesbaden Kochbrunnen, than in cold springs, such as Niederselters. Marked variations in the strength of mineralisation or in the temperature of mineral waters, occurring simultaneously with very dry or rainy weather, lead to a suspicion that the source is not properly protected against contamination by surface water. It may be noted that highly mineralised waters, such as the active 'bitter waters' and the almost saturated brines, are more likely to show variations in their mineralisation from time to time than are waters of weak mineralisation.

[2] The authors will, of course, be glad to see copies of recent analyses, so that errors may be corrected, should there be another edition.

has been considered that the number of grammes in a litre (1,000 cubic centimetres of the water), although the first is a weight and the second a volume, may be sufficiently accurately expressed as the quantity per mille. It would be convenient if analyses of mineral waters were always expressed in this form (or still better as grammes per 1,000 grammes by weight of water), which has the advantage of being international and which, owing to the introduction of 1 per cent. solutions into the British Pharmacopœia, is an expression of measurement already familiar to English medical men, and with the use of decimal weights and measures in prescribing will soon become still more so. The amount per mille need of course only be multiplied by 70 to transform it into the number of grains per imperial gallon. All temperatures are given in degrees of the Fahrenheit scale, as is usual in England.

Though the book is chiefly about mineral water health resorts and their uses, climatic and hydrotherapeutic treatment are taken into consideration, and questions of diet, exercise and general regimen are likewise touched on. The important subject of after-cures to spa treatment alone necessitates some notice of climates, and it is hoped that the short chapters on climatic health resorts will be found of use, though the relative merits of the different places mentioned cannot of course be fully discussed in a work like the present.

It will be conceded, we trust, that the usefulness of treatment at health resorts is not overstated, but restricted to fair limits. By consulting Chapter XX. (for selecting health resorts and mineral waters in various affections) and comparing it with the notices of the health resorts in the preceding chapters, it will be seen

that complaints, the same as far as name goes, may be treated with advantage at different localities. It is hoped that the present volume may be of some service to the medical man in his selection of health resorts to suit the requirements and convenience of individual patients, though books are not all that is required for this purpose. It is also very important for the doctor at home to make himself, by personal visits, more intimately acquainted with the different spas and health resorts and with their local doctors. A thorough knowledge is necessary of the special features of the localities, their situation, their natural beauty and configuration, their climate and vegetation, as well as the accommodation, prevailing habits, and the society probably to be met with. The knowledge of the character and qualities of the local medical men is equally or even more important. It will be acknowledged that the amount of influence for good which the doctor at home exercises on his patients affected with chronic troubles depends to a great degree not only on his intimate knowledge of the disease and the constitution, but on a certain sympathy, in the wider sense of the word, which arises from an insight into the mental condition and character of the patient, and which enables the doctor to put himself into accord with him, and express his advice in such a way that it induces the patient to follow it. It is therefore necessary to find, if possible, a doctor at the spa who is conscientious, intelligent, sympathetic, and firm. Shakspeare would have been the greatest physician, and amongst recent doctors Sir William Gull owed his great success to such qualities.

H. W.
F. P. W.

June 1898.

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Comparative Scale of Temperatures

Centigrade	Fahrenheit	Réaumur	Centigrade	Fahrenheit	Réaumur
80°	176°	64°	50°	122°	40°
79	174·2	63·2	49	120·2	39·2
78	172·4	62·4	48	118·4	38·4
77	170·6	61·6	47	116·6	37·6
76	168·8	60·8	46	114·8	36·8
75	167	60	45	113	36
74	165·2	59·2	44	111·2	35·2
73	163·4	58·4	43	109·4	34·4
72	161·6	57·6	42	107·6	33·6
71	159·8	56·8	41	105·8	32·8
70	158	56	40	104	32
69	156·2	55·2	39	102·2	31·2
68	154·4	54·4	38	100·4	30·4
67	152·6	53·6	37	98·6	29·6
66	150·8	52·8	36	96·8	28·8
65	149	52	35	95	28
64	147·2	51·2	34	93·2	27·2
63	145·4	50·4	33	91·4	26·4
62	143·6	49·6	32	89·6	25·6
61	141·8	48·8	31	87·8	24·8
60	140	48	30	86	24
59	138·2	47·2	29	84·2	23·2
58	136·4	46·4	28	82·4	22·4
57	134·6	45·6	27	80·6	21·6
56	132·8	44·8	26	78·8	20·8
55	131	44	25	77	20
54	129·2	43·2	24	75·2	19·2
53	127·4	42·4	23	73·4	18·4
52	125·6	41·6	22	71·6	17·6
51	123·8	40·8	21	69·8	16·8
			20	68	16

THE

MINERAL WATERS AND HEALTH RESORTS OF EUROPE

CHAPTER I

HYDROTHERAPEUTICS, OR THE THERAPEUTIC USE OF PLAIN WATER

As hydrotherapeutic treatment plays a very important part in the results attained at many spas, and as the effect of many mineral water baths is nearly the same as the effect of the external application of plain water at a given temperature, it has been thought advisable to give a short account of the principles of hydrotherapeutics.

Definition, &c.

Hydrotherapeutics (Hydrotherapy) deals with the therapeutic use of simple water when taken internally[1] or when applied externally in the form of baths, douches, vapour baths, &c. Hydrotherapeutic treatment may be employed in both chronic and acute affections, but for the purpose of this book it is only necessary to consider its use in chronic diseases.

History

Though known to the ancient Greeks and Romans,

[1] Some consider that hydrotherapeutics does not include the internal use of water; others would still further restrict the meaning of the term, and exclude everything except the external use of cold water ('cold water cure.')

and practised to a variable extent in modern Europe from the sixteenth century, it was Vincent Priessnitz, of Graefenberg, in Silesia, who first made this kind of treatment widely known. Its too indiscriminate and energetic use, however, often led to bad results, and its more serious study by regular physicians became urgently needed. In the latter half of the present century much labour has been devoted to the scientific study of the subject, with the result that hydrotherapeutic treatment now rests on a firmer scientific basis, as the works of Winternitz, Fleury, Hayem, and many other writers abundantly show.

Internal use of water

The internal use of plain water.—The amount of liquid taken habitually varies much in different individuals, partly owing to individual tendencies and mere habit, partly owing to mode of life. Abundant water drinking probably in most cases leads to increase in the fluids secreted by the body, and for a time at least to increased excretion of urea and the waste products of tissue metabolism, the tissues and the blood itself being, so to speak, washed out by the treatment. In many cases of old standing valvular heart disease, especially in imperfectly compensated mitral disease, in obese people with weakly acting hearts, and in patients suffering from atony or more or less actual dilatation of the stomach, it is important to limit the fluid part of the food, especially the fluids taken at meal-times; in some cases, also, excessive water-drinking may lead to dyspeptic troubles. Nevertheless, increase in the amount of water taken internally may be of service as part of the treatment for gout, tendency to urinary gravel or gall-stones, and in constipation from insufficient intestinal secretion. If the ordinary drinking water of the locality be too hard, or of doubtful purity, exported waters of known purity, such as those of Malvern, Evian, &c. may be obtained, or distilled water may be used, which for some patients may, like Salutaris water, be artificially aërated.

A considerable part of the results obtained from

courses of mineral waters is really due simply to the increase in the amount of water drunk.

A moderate draught of cold water acts as a stimulant to the musculature of the stomach, and probably reflexly through the pneumogastric nerve, the frequency of the heart's action is temporarily diminished [1]; in some cases, indeed, an unpleasant shock may be produced by the incautious use of cold water, especially of aërated cold water. A refreshing glass of cold water on rising removes subjective gastric disturbances in many persons, and may aid the action of the bowels. Warm water as taken internally at indifferent thermal springs is more rapidly and easily absorbed, and subtracts less heat from the body than cold water; warm water is often to be preferred in nervous excitable subjects, for diuretic purposes in weak, gouty and rheumatic patients, especially when taken at bed-time or when cold water causes gastro-intestinal disturbance.

Methods of external application

The external use of plain water.—The modes of application are very various, comprising the ordinary full bath at different temperatures, hip baths, wave baths, and baths in running water, wrapping in wet sheets, friction with a wet towel, shower baths, affusions and all kinds of douches. The temperature of the douches can be varied during the application ('Scotch douche,' 'alternating douche'). Douches may be applied under the water of an ordinary or mineral water bath (the 'submarine douche' of a French author), and in such cases the temperature of the douche may be hotter or colder than that of the bath. In actual

[1] Cold water drinking causes temporary reduction of pulse frequency and temporary slight fall of the body temperature, especially of the 'internal' temperature (as measured in the rectum), with a perceptible reduction even in the temperature of the urine voided. Similar effects are observed after cold water enemata. Winternitz found a reduction of 1·6° F. in the gastric temperature after an enema. Considerations as to the effects on the circulation, nervous system, and body temperature, which are exerted by the internal use of water in the form of draughts, and lavage of the stomach and large intestine, constitute a department of hydrotherapeutics which may be termed 'internal hydrotherapeutics.'

practice it has been found that, when good results are possible, they can usually be obtained by the judicious use of a very limited number of appliances. Some of the more complicated appliances, such as the well-known one with a series of open rings for giving circular douches at different levels, are much less used now than they were when first introduced.

Electric baths

'Electric baths' combine hydrotherapeutic and electrical treatment. In the ingenious 'hydro-electric douche,' which was lately investigated by Paul Guyenot in France, the incident stream of water is made to serve as the anode or the kathode of the electric current, which is applied simultaneously with the douche.

Hot air and vapour baths

Allied to hot water baths are the various forms of *hot air and vapour baths* which, for convenience, are likewise included under the term 'hydrotherapeutics.' These can be given at higher temperatures than hot water baths, and produce a greater amount of sweating. Local baths and douches of hot vapour and hot air are likewise sometimes made use of, especially the Berthollet vapour baths and the Tallerman-Sheffield hot air baths.

It need hardly be mentioned that the temperature of douche-rooms and dressing-rooms should be properly regulated. The air in the rooms should never be allowed to get foul, and if constant ventilation during use be impossible, as in the case of the small vapour baths used at some spas, thorough ventilation at suitable intervals between use is required. Floors, walls, and all the apparatus used should always be kept perfectly clean. Not only should they be clean, but, for the sake of the impression on the patient's mind, they should always look clean. It must be owned that the appearance of 'box' vapour baths, the seats used for rectal douches and other apparatus, is often anything but pleasant, for although they may in reality be clean, yet owing to discoloration and want of repair, they often look dirty. In this respect the bright-looking polished 'box' vapour baths on the Berthe system are excellent.

Reaction of the body to cold and heat

The results of treatment by all these means are in great measure due to the natural reaction of the body to cold and heat; water is generally preferred to air for this purpose, because its greater specific heat and greater co-efficient of heat-conductivity renders it more active in bringing about the reaction. Human beings are particularly susceptible to hydrotherapeutic effects, because the skin, unlike that of most warm-blooded animals, is unprotected by any natural covering. The clothes, moreover, by which the body is usually protected, render the skin still more sensitive to changes of temperature, since they form a kind of habitual thermal zone about the body, the temperature of which has been shown by Winternitz to remain fairly constant at about 89·6° F. (32° C.).

Temperatures of baths

An ordinary bath must therefore have a temperature of some degrees below or above 89·6° F. in order that a decided reaction can be obtained; though owing to mechanical stimulation, a douche, even at tepid or neutral temperatures, can exercise some reactive effect. Baths between 85° and 95° F. are called tepid (ordinary temperature 90° F.). Any bath below 70° F. is called cold. Hot baths are those of, or over, 96° F. Those from 104° to 114° F. are very hot, and even local applications, such as douches at 111° F., seem as hot as can well be borne, though hot vapour baths are given at 122° F., and the temperature of the calidarium of hot air baths is 130° to 150° F., or more. In Roman baths, if there are several very hot chambers, the hottest is occasionally kept at 230° F., and in local hot air baths, by the Tallerman-Sheffield apparatus, temperatures even of 260° to 300° F. can be made use of.

Hydrotherapeutic reaction for cold

When a man jumps into a cold bath, the cold produces at first a disagreeable impression. He shivers, and, after an almost involuntary pause in breathing, inspires very deeply. Owing to the contraction of the cutaneous blood-vessels, the skin is pale, and the contraction of the unstriped muscle fibres gives rise to the

phenomenon of goose skin. These effects may give place to the 'reaction' whilst he still remains in the bath, or only when he comes out of it. The pallor of the skin changes to slight reddening, accompanied by an agreeable subjective sensation of warmth, easy breathing, and a feeling of comfort and capability for exertion.

The rapidity and degree of this 'hydrotherapeutic reaction for cold' varies very much in different individuals. It is delayed in the weak and feeble, but takes place rapidly in the robust and strong, especially if these have been in the habit of taking cold baths. The reaction in a given case depends on the temperature of the water, the length of the application, the movement of the water (as in wave-baths of all kinds), and, in the case of a douche, on the force with which it is applied; it is greatly assisted by voluntary muscular action, and by friction to the skin before, during or after the application. The best reaction with the least loss of heat is generally obtained by cold applications of short duration, administered when the patient is hot.

Mechanism of the reaction

The vascular and respiratory phenomena following on the application of cold water to the surface of the body have been experimentally shown to be mainly, if not entirely, due to nervous reflex action; moreover, in the case of men with partial paralysis and anæsthesia, the vascular phenomena have been found diminished or absent in the paralysed limbs. That the respiratory phenomena are not altogether voluntary is shown by similar reflex movements being obtained through stimulation of the skin in animals rendered insensible by chloral (Roehrig).

The initial pallor of the skin is due to contraction of the cutaneous blood-vessels, and must be interpreted as a reflex attempt on the part of the organism to hinder excessive loss of heat, or, at least, to moderate it until increased heat production in the body can be established to counter-balance the increased loss. When the re-

action sets in, the cutaneous blood-vessels become dilated, giving rise to redness of the skin and a subjective sensation of warmth. The blood is the great carrier and distributor of heat through the body, and it is probable that, corresponding with the cutaneous pallor, the internal blood-vessels become dilated and the central temperature rises slightly; whereas, when the surface vessels during the reaction dilate, the skin feels warmer, and, the internal parts of the body being less supplied with blood, the central temperature undergoes a slight fall.

Result of cold water applications

Liebermeister was the first to prove experimentally that heat production in the body is increased by application of cold to the skin. Increased heat production requires increased combustion in the tissues, and this is evidenced, as it is during muscular exercise, by increase in the amount of carbonic acid gas expired. The increased flow of urine following the bath is certainly not due to the very small quantity of water estimated as absorbed during a bath through the skin, but is doubtless due to increased blood pressure and circulation in the kidneys.

By cold water treatment the heart's action should be strengthened, the respiratory organs exercised, the appetite increased, the digestion of food aided, and the movements of the bowels rendered more active; moreover, undue accumulation of waste products in the tissues will be prevented, owing to the more perfect oxidation within the body and the increased removal by the urinary and other excretions. Secondarily, and gradually, the quality of the blood [1] will be improved, and the nutrition of all the

[1] Murri (*Policlinico*, 1894, No. 12), during the application of cold baths, has observed a temporary increase in the number of red corpuscles present in the circulating blood. This may be compared to the increase in red corpuscles shown by J. K. Mitchell (*American Journal of Med. Sciences*, 1894) to be an immediate result of general massage. It is not to be confounded with the gradual increase of red corpuscles and hæmoglobin in the blood of anæmic patients, which was found by Dr. Thermes (quoted by Scheuer, *Essai sur l'hydrothérapie dans les états chloro-anémiques*, Paris, 1885, p. 99), to result from a judicious course of

tissues of the body furthered. The tonic effect on the nervous and muscular systems produces a desire for physical exertion, and makes work feel lighter. Moreover, the resulting increase in the amount of exercise taken will lead to the processes of metabolism being more speedily and more perfectly carried out; this will be of great utility for invalids of a torpid and phlegmatic type, especially those who are rather inclined to be fat.

Hydrotherapeutic reaction for heat

In hot water [1] treatment the most marked phenomenon is the dilatation of the superficial blood-vessels, which passes slowly off when the application is discontinued. With the dilatation of the surface vessels are associated increased secretion of sweat, and greater frequency of respiration. This triple effect of the treatment constitutes the reaction of the body to heat, and the three phenomena must be interpreted as the means by which the animal mechanism produces an increased loss of heat to counteract the heating effect of the hot application. The sweating is of course greatest in a hot air bath, though often more visible, as well as more rapidly and comfortably obtained, in a hot vapour bath.

Results of hot water applications

When the application of heat is general and sufficiently prolonged, a decided sedative effect follows the preliminary excitation, and is probably due in part to a certain anæmia of the brain and internal organs accompanying the superficial vaso-dilatation, and in part to diminished combustion in the tissues, accompanying diminution in the amount of heat production required to maintain the body temperature. A diminished desire

hydrotherapeutic treatment. A sudden increase in the number of both red and white corpuscles may be merely a mechanical result of various therapeutic procedures (baths, massage, and any kind of exercise), and may be explained, after J. K. Mitchell and H. Senator (von Leyden's *Handbuch der Ernährungstherapie*, vol. i. p. 365) by supposing that a number of corpuscles, which had previously been lying arrested in various parts of the body, especially in the abdominal viscera, are carried back into the circulating blood owing to a sudden improvement in the circulation.

[1] Hot baths are those of, or over, 96° F.; very hot baths are those of 104° to 114° F.

for exercise is part of the general sedative action following hot baths, and a period of rest must generally be allowed to follow hot baths (whether of water, air or vapour) and hot douches. The occasionally somewhat constipating action on the bowels may be due in part to diminished peristalsis, and in part to relative anæmia and a diminution of intestinal secretion contrasting with the increased secretion of sweat.

Reactions for local applications

When the application of cold or hot water is limited to one part of the body instead of being general, certain remote reactions have been observed to take place, forming an additional argument in favour of the phenomena of the general reaction being of reflex nervous nature. Apparently when a limb is immersed in cold water, the corresponding limb of the opposite side reacts with it, becomes like it colder, and, like it, shows diminution in volume as measured by the plethysmograph, the diminution in volume being doubtless due to reflex vaso-constriction. According to some observers, inverse phenomena take place at another level of the body; thus, during the application of a cold hip bath, Winternitz observed an increase in the volume of the arm.

Utility of hydrotherapeutic treatment

Hot applications

Simple hydrotherapeutic treatment is often combined with residence at some health resort, and in such cases, change of air, food, occupation and mode of life must contribute largely to the result arrived at. *Hot* water, air, or vapour baths (local or general), and the dry or wet pack, may be useful in ‘ muscular rheumatism ’ and lumbago ; treatment by diet, massage, &c. is often combined. In chronic rheumatism, gout, and the uric acid diathesis, the milder hydrotherapeutic procedures are usually preferred, combined with the regulation of diet, active and passive exercise, and the diuretic effect of water taken internally. Hot, or alternate (‘ Scotch ’) hot and cold, douches, combined or not with massage, are often employed for the stiffness and thickening produced by rheumatoid arthritis, chronic or subacute rheumatism, gout, and old injuries about the joints; also for some

cases of sciatica and the so-called 'rheumatic' neuralgias. Local hot vapour (Berthollet) and hot air (Tallerman-Sheffield) baths give promising results in a similar class of cases, especially if there is much pain. They can be given at higher temperatures, and are not so fatiguing as general baths; they are, therefore, more suitable in weak patients, and persons with dilated hearts. As a general rule, however, when the local affection depends more or less on constitutional causes, unless there be special contra-indications, the application (douche, vapour baths, douche-massage, &c.) should be general, though specially directed in regard to the local complaint.

Cold applications

Cold water treatment is useful in cases where it is desired to stimulate the general nutrition, as in slighter forms of anæmia and other cachectic conditions, in some cases of atonic and nervous dyspepsia, and in many functional nervous disorders. It serves to 'harden the skin,' that is, to render it less susceptible to reflex influences, and thus may be of use to persons with a great liability to 'catch cold,' to suffer from muscular pains, or repeated attacks of diarrhœa. It may be employed in the tonic treatment of convalescents, or in the 'after-cure' of persons treated by saline mineral waters for gastric catarrh, &c. Some patients with habitual constipation, and women with profuse menstruation of constitutional origin, derive benefit from cold water treatment. In all cases, however, the methods to be adopted must be selected with due regard to the general strength and reactive power of the individual patient.

Tepid baths

Tepid baths are naturally preferred, when a macerating action on the skin is required, or when, for any other reason, a very prolonged application is wanted. For their sedative effect on the nervous system they can often be employed (especially the natural thermal waters) for functional nervous affections, insomnia, and various nutritional disorders, when occurring in the erethic class of persons.

Precautions and contra-indications

In weak patients, especially those of a nervous excitable temperament, a course of cold water treatment is often made to begin by tepid douches, friction with a wet towel, or some other of the less active hydrotherapeutic procedures, the cold douche itself, or immersion in cold water, being withheld during the early part of the course, but being gradually led up to by the preliminary measures. In patients who feel the loss of heat excessively, especially if preliminary warming by exercise be difficult, a cold douche or cold bath of very short duration may be immediately preceded by a warming application (hot bath, vapour bath, hot douche), or the douche may be gently alternating, hot and cold, so as to obtain a strong reaction without withdrawing too much heat from the body. Preliminary hot baths and soaping are also sometimes of use to render the skin more sensitive, and facilitate the reaction by the removal of greasy matter from the surface of the body.

For the success of cold water treatment it is necessary that the organism can stand some abstraction of heat, that it can react to the stimulus of the cold, and that the digestive and assimilative organs are in fair condition. Especial care is needed in debility due to disease, in the weakness of early childhood, in older children, about the period of puberty, when they have 'outgrown their strength,' and in old age. Cold-water treatment is to be avoided in cases of chronic nephritis, considerable arterio-sclerosis, in all cases of aneurism, in tendency to hæmorrhage from the lungs or stomach, and where there has been an attack of cerebral hæmorrhage, or where the occurrence of an attack is feared. It is likewise contra-indicated in all cases of heart disease, except slight, well-compensated affections of the mitral valve. Very hot baths are to be avoided in tendency to hæmorrhages and cerebral congestion, in most cases of cardiac and vascular disease, and in feeble

and erethic individuals. Care must be taken not to overheat the body, and therefore all very hot applications, if general, must be of short duration. Needless to say, no baths of whatever sort should be taken soon after meals, when a specially great amount of blood is required in the abdomen for purposes of digestion. In cases of disease hydrotherapeutic treatment should only be carried out under the supervision of a medical man.

Localities for hydrotherapeutic treatment

There exist a large number of establishments where hydrotherapeutic treatment can be obtained. It will be sufficient to enumerate some of them. In England there are those of Malvern, Matlock, Sidmouth, Conishead Priory near Ulverston, Ben Rhydding, Ilkley, Farnborough, Bushey (near Watford), Beulah Spa (Upper Norwood), &c. In Scotland there are those of Dunblane, Crieff, Peebles, Wemyss Bay, Pitlochry, and others. In Ireland there is St. Anne's Hill (Blarney, in County Cork). In Germany and Austria there are those of Nassau, on the Lahn; Godesberg, on the Rhine, near Bonn; Marienberg and Mühlbad, at Boppard, on the Rhine; Laubbach, near Coblenz; Ilmenau, Liebenstein, Sonneberg, Elgersburg, and Schleusingen, in the Thuringian Forest; Bad Nerothal and Dietenmühle at Wiesbaden; Reinbeck (Sophienbad), near Hamburg; Bad Stuer, on the Plauer See in Mecklenburg-Schwerin; Teinach, in the Würtemburg Black Forest; Lauterberg, in the Harz mountains; Wilhelmshöhe, near Kassel; Schweizermühle and Koenigsbrunn, in the 'Saxon Switzerland'; Koenigstein, in the Taunus; Alexandersbad, near Wunsiedel, in Bavaria; Graefenberg-Freiwaldau, in Austrian Silesia; Kaltenleutgeben, not far from Vienna; Kaltenbrunn, near Voeslau; Kaltenbach, at Ischl in Austria; and very many others. In Switzerland there are the establishments of Champel, near Geneva; Aigle-les-Bains; Rigi-Kaltbad; Schönbrunn, and Schönfels near Zug; Schöneck, above the Lake of Lucerne; Mammern, in Canton Thurgau; Brestenberg, in Canton Aargau, and other places. In France there are establishments at

Paris, Auteuil, Gérardmer, Divonne, Nice, Bordeaux, &c.; and treatment can be had at Monaco. In Belgium we may mention Dinant. There are likewise establishments for hydrotherapeutic treatment at most of the chief Continental spas. Those in England are fewer in number, and usually more of the nature of ordinary hotels than those abroad.

Associated treatment

At many spas and health resorts besides those mentioned in the foregoing list, simple hydrotherapeutic processes are made use of, and in all such cases, as has been already stated, one obtains the associated effects of change of air, food, occupation, and mode of life. Hydrotherapeutic courses may likewise be combined with massage, Swedish gymnastics, graduated walking or cycling exercises, with special dietetic 'cures,' and with the internal use of mineral waters or ordinary pharmaceutical preparations. At some hydrotherapeutic establishments baths of artificial mineral waters, brine baths, mud baths, &c., can likewise be obtained. Sometimes balsams and various aromatic substances are added to baths ('pine baths,' 'aromatic baths,' &c.) on account of their agreeable or slightly stimulating effect. With these may be mentioned the sea-weed ('ozone,' 'iodine') baths, employed at some seaside resorts.

CHAPTER II

CONSTITUENTS AND CLASSIFICATION OF MINERAL WATERS

Definition of natural mineral waters

Natural mineral waters form a part of Materia Medica, and from very early times have been employed in the treatment of disease, either internally or in the form of baths. As a convenient definition from the medical point of view, we choose the following: Natural mineral waters are all waters which, as obtained from nature, are distinguished from ordinary waters either by the salts or gases they contain in solution or by their temperature being elevated.

It may seem a stretch of the term to include as mineral water springs simple thermal ones hardly differing from ordinary springs except by the elevated temperature of their waters, but it is certainly convenient, as well as the custom, to do so. It must, moreover, be remembered that before chemical analyses were made, attention had been drawn to many springs on account of the natural warmth of their waters, rather than on account of any special taste or smell due to peculiar chemical constituents. The Roman remains at thermal springs, such as Bath in England, bear abundant evidence to this. In other cases, probably the smell of hydrosulphuric gas, the taste of Epsom salt, common salt, or iron, or the appearance of ochreous or other deposits, first drew special attention to the springs, though in many cases some curious tradition, superstitious belief, or ceremony was, later on, connected with the origin of the use of medicinal springs.

Relative suitability for medical purposes

Not all mineral waters are suitable for use in medicine. Some of the strong iron waters, such as that of Sandrock, in the Isle of Wight, contain too much of the irritant sulphate of iron to be used internally in ordinary cases of anæmia. Some waters contain too much of the sulphate and carbonate of lime. The sea, one of the strongest of mineral waters, though of great use for bathing, is seldom employed internally on account of the excess of common salt and disagreeable taste.

Temperature of the springs

The temperatures of springs differ widely from each other. Chaudes Aigues, in France, has waters of at least 180° F., and Ax-les-Thermes in the Pyrenees possesses a spring of 171·5° F. Nearer to England there is a spring at Burtscheid, adjoining Aix-la-Chapelle, whose temperature reaches 167° F. Some of the Russian waters are still hotter. According to Dr. F. G. Clemow, the waters of Goriatchevodsk and Bragoun, in the Caucasus, vary from 190° F. to 197° F. (92° C.), whilst the springs of Bananin, in Kamtchatka, of Kalvadjar, in the Caucasus, and the hot spring of Karkin, in Transbaikalia, are all of them said to be at or near boiling point; but are overtopped by the Great Geyser of Iceland, whose water twenty metres below the surface has been ascertained to be at 255° F. (124° C.), much above boiling point, and to be at boiling point on the surface. The other extreme is illustrated by the springs of Yamarof, in Eastern Siberia, whose temperature is only 35·4° F. (1·9° C.), and therefore only slightly above freezing point.

The abundant supply of some of the hot springs is extraordinary, and during winter they might be used by the inhabitants of towns like Ax for heating their dwelling houses. For medical purposes the high temperatures are of course useless, and necessitate special arrangements to cool the water before it can be employed in baths; for various domestic purposes, however, and for some trades, such waters, especially if the supply is abundant as at Ax-les-Thermes, may be of considerable use.

Method of classification

Various classifications of mineral waters may be attempted. They may be arranged according to their natural temperatures, according to their chemical constituents, or according to their therapeutic action. All classifications have their disadvantages, but the division into groups, according to the chief active chemical constituents of the different waters, is found most convenient, and is adopted in some form or other in nearly all works on mineral waters. Some waters are chiefly employed externally, others internally, and this has likewise influenced us in classifying certain spas, especially in the indifferent thermal group, and will be referred to when the individual spas are considered.

Constituents of mineral waters

The list of elements which have been recognised—at all events, in traces—as present in mineral waters is very large, but it will be here more practical to enumerate only the chemical combinations[1] in which the elements occur dissolved in the waters. These are chloride of sodium (common salt), sulphate of sodium (Glauber's salt), sulphate of magnesium (Epsom salt), carbonate of sodium, sulphate of calcium (gypsum), and carbonate of calcium (chalk). In small quantities there occur carbonate of iron (the protocarbonate or ferrous carbonate), sulphate of iron (both the protosulphate or ferrous sulphate and the persulphate or ferric sulphate), chloride of iron (the protochloride or ferrous chloride), and crenate of iron, the bromides and iodides of sodium, magnesium and potassium, sulphides of sodium and calcium, arseniates of sodium, calcium, magnesium and iron.

Together with the chlorides, carbonates, and sulphates previously mentioned are found the chlorides of calcium, magnesium, barium, strontium, lithium, potassium, ammonium, and manganesium; the carbonates of magnesium, potassium, lithium, strontium, mangane-

[1] The grouping, however, of analytical constituents into the chemical combinations in which they are supposed to be present, is partly theoretical, and other interpretations of the data furnished by analysis are sometimes possible.

sium, &c.; sulphates of potassium, aluminium, barium, copper, strontium, cobalt, nickel (Roncegno) and manganesium; borates, nitrates, phosphates, and silicates; the occurrence of these salts in minute quantities or traces is generally of little therapeutic interest, but the chlorides of calcium, magnesium, and barium probably occur in sufficiently large quantities to exert some effect (see Chapter III.). Other mineral substances are found in traces, including the rare metals cæsium and rubidium, which were first detected through spectrum analysis (1860–1861) by Bunsen and Kirchhoff in the mineral waters of Dürkheim.

Some springs contain an admixture of naphtha or bituminous material, for instance, a spring at Ivonicz, in Galicia, the Source Vallière at Clermont-Ferrand, the sulphurous Source Saint-Boès in the Pyrenees, a muriated spring at Salsomaggiore in Italy, the springs of Goriatchevodsk and Bragoun, in the Caucasus, &c. In some waters, especially of the thermal sulphur and simple thermal groups, there are likewise organic and living organised substances, such as the jellylike barégine, which derives its name from being present in the waters of Barèges.

Gases present in mineral waters

The most important gases dissolved in mineral waters are carbonic acid gas and sulphuretted hydrogen. Some waters contain an unusual amount of oxygen and nitrogen. The inflammable carburetted hydrogen, or marsh gas, is occasionally found (Porretta and Acireale, &c.), and in the waters of Harkany, in Hungary, the inflammable gas, carbonyl sulphide, or oxysulphide of carbon (COS), was first discovered in the year 1867 by Karl von Than. In 1895 the chemically indifferent gas 'argon,' shortly after its discovery (1894), by Lord Rayleigh, as a constituent of atmospheric air, was found to be present in the thermal waters of Bath, Buxton, Wildbad, &c. Argon is doubtless present in waters which are fairly rich in free nitrogen. The gas 'helium,' previously to its discovery in certain minerals in 1895

by Professor Ramsay, had been known to exist only by its band in the spectrum of the solar chromosphere, which was first discovered by Norman Lockyer and E. Frankland during the sun's eclipse of 1868; shortly after Professor Ramsay's discovery it was found to be present in association with 'argon' in the waters of Bath and in some of the Cauterets waters; though, according to Lord Rayleigh, probably hardly any traces of it exist in the earth's atmosphere.

The classification adopted is that into:

Simple thermal group of mineral waters

1. *Simple or indifferent thermal waters* ('akrato-thermal waters,' or 'eaux oligo-métalliques chaudes').—These are poor in solid and gaseous substances, of low specific gravity, almost tasteless, of great transparency and softness. Their temperature lies generally between 80° F. and 150° F. Some contain an unusual amount of oxygen, some of nitrogen; argon and helium have also been found in waters of this group.

On account of their being frequently situated in wild mountainous regions the name 'Wildbäder' (*Thermæ silvestres*) has been given to this class of baths. There is no proof that the electrical conditions of these waters are peculiar, as has been suggested. There is also no proof that the alkaline silicates in solution are present in sufficient quantity to exercise any medicinal effect.

Muriated group

2. *Common salt or muriated waters.*—The first name is derived from their chief solid constituent—common salt—which, however, is likewise present in some waters of the other groups. The second name, 'Muriated Waters,'[1] is preferable on account of the presence, some-

[1] It would, perhaps, be more strictly correct to keep to the older nomenclature, and call these waters 'Muriated Saline Waters,' that is, mineral waters, the *salts* dissolved in which are chlorides (*muriates*). On the other hand, the term 'muriated' has the advantage of being shorter than 'muriated saline,' and a shorter term is preferable, especially when speaking of compound mineral waters, such as muriated chalybeate, muriated alkaline, &c. Moreover, the term 'saline' is often used both in England and Germany in special reference to the purgative salts sulphate of sodium and sulphate of magnesium, and thus 'muriated saline waters' might be wrongly understood to mean the waters which we have here called 'muriated sulphated.'

times in appreciable amount, of other chlorides (the chlorides of calcium, barium, magnesium, lithium, potassium, and strontium). Many waters of this group are rich in free carbonic acid gas. In addition to chlorides, small quantities of bromides and iodides (especially those of sodium and magnesium) are sometimes present; the amount of bicarbonate of iron occasionally deserves notice. These and other admixtures may modify the action of the common salt. The proportion of common salt varies from 2 or 3 to about 300 per mille in these waters; in fact, there are waters, like those of Droitwich, which are almost saturated solutions, so that heating them leads to precipitation of some of the salt. The stronger muriated waters (brines, 'Soolen') are almost all cold and non-gaseous, and are used for brine baths ('Soolbæder'), after preparatory warming. There are likewise in this group certain warm gaseous waters (Nauheim, Oeynhausen) of moderate strength in common salt, which can be used for giving warm effervescent baths ('Thermal-Soolbæder').

Alkaline groups

3. *Alkaline waters.*—Nearly all mineral waters give an alkaline reaction, but this group receives its name because carbonate of sodium is a very prominent constituent. These waters likewise almost always contain a considerable amount of free carbonic acid gas, and according to the presence or absence of much chloride of sodium or sulphate of sodium may be subdivided into three classes:

(*a*) Simple alkaline waters.

(*b*) Muriated alkaline waters.

(*c*) Sulphated alkaline waters.

Sulphated groups

4. *Sulphated and muriated sulphated waters.*—In these sulphate of magnesium and sulphate of sodium, with or without common salt, are the chief ingredients. Those tasting of the bitter magnesium are commonly termed 'bitter waters.' Most of this group are used as aperient waters at home, but some of the less strongly mineralised muriated sulphated waters (Brides-les-Bains, Leamington, &c.) are used at the spas themselves.

Chalybeate group

5. *Iron or chalybeate waters.*—This group includes those waters in which iron is contained in sufficient amount to confer on them a therapeutic action. The iron in mineral waters is usually contained in the therapeutically more valuable form of the bicarbonate, more rarely it occurs as protosulphate, persulphate, or protochloride. Occasionally it is associated with the presence of arsenic. Alum is often present in sulphate of iron waters. Chloride of iron is said sometimes to be present with common salt, and to be associated with barium chloride and calcium chloride in the chloride of iron spring at Harrogate.

Arsenical group

6. *Arsenical waters.*—Waters which contain a sufficient amount of arsenic to exert a special therapeutic effect are conveniently classed in a group by themselves. In some waters, however, as those of Mont Dore, which have for convenience been placed in this group, it may be doubted whether the arsenic is present in sufficient quantity to exert any therapeutic action. In the strongest waters of this group the arsenic accompanies sulphate of iron; it likewise occurs in association with bicarbonate of iron, chloride and bicarbonate of sodium, &c.

Sulphurous group

7. *Sulphur waters.*—These contain sulphuretted hydrogen or a sulphide of sodium, calcium, potassium, or magnesium, in appreciable amount. Some are thermal, others cold. Some are simple, others are compound, containing an admixture of common salt or other salts sufficient in amount to exercise an influence on their therapeutic action. The total of solids found in solution in sulphur waters is, however, usually very small, and especially is this the case in the sulphide of sodium group, of which the Pyrenean sulphur spas (Bagnères-de-Luchon, Cauterets, &c.) may be considered the representatives.

Low forms of living organisms flourish in the thermal sulphur waters, especially those belonging to the vegetable world (such as aquatic fission-fungi, *Beggiatoa alba*, *Thiothrix nivea*, *Byssus lanuginosa*), and these give

rise to the flaky, jelly-like substances, called glairine, barégine, &c. usually found in this class of waters. Calcium sulphide, when occurring in waters containing sulphate of calcium, is supposed by certain authorities (*v.* Égasse and Guyenot, *Eaux Minérales de France*, 1891, p. 30) to be sometimes due to the passage of these waters through soil rich in organic material, which, by withdrawing the oxygen from the sulphate, they suppose gives rise to the sulphide. Waters in marshy districts may contain sulphuretted hydrogen, resulting from the decomposition of vegetable matter; such waters may be suspected of conveying the germs of malaria where this disease exists.

Earthy group

8. *Earthy or calcareous waters.*—Here the chief constituents are carbonate and sulphate of calcium, and carbonate of magnesium. These waters may be termed 'alkaline earthy waters' when carbonates of calcium and magnesium are the chief constituents, and may be termed 'gypsum waters' when sulphate of calcium forms the chief constituent. Many earthy waters contain varying amounts of iron, sulphur, common salts, &c. sometimes making it necessary to give them likewise a place in other groups. Waters containing both bicarbonate of sodium and bicarbonate of calcium (French: *eaux bicarbonatées mixtes*) may be classed as members either of the simple alkaline or of the earthy alkaline group, according to the preponderance of the former or the latter amongst their minéral constituents.

Table waters, &c.

9. *Table waters and other very weakly mineralised cold waters.*—Cold waters belonging to one or other of the preceding groups, but very weakly mineralised, often form pleasant 'table waters' on account of the carbonic acid gas they contain, and are classed as a separate group, analogous to the simple thermal group, but cold and gaseous. To this group may be conveniently added some other weakly mineralised cold waters (French: *eaux oligo-métalliques froides*), which can hardly be classed in one of the previous groups, but still deserve notice on

account of a special therapeutic influence attributed to them. Such waters are those of Krankenheil, with a total mineralisation of about 1 per mille (containing a minute quantity of iodide of sodium), and those of Saint-Christau, in the French Pyrenees, interesting for the minute quantity of sulphate of copper they contain, though their total mineralisation is only about ·3 per mille.

Possible importance of the presence of very minute amounts of salts in mineral waters

We have not thought it necessary or advisable to give complete analyses of the different mineral waters mentioned in the book, but have confined ourselves to noting the relative amounts of the chief constituents. It must be confessed, however, that minute quantities, apparently too insignificant to deserve mention, may ultimately turn out to have a real importance, combined as they are with numerous other ingredients in natural mineral waters. The following is a single instance of the difficulties which constantly arise. Dr. R. Saundby (Article on Diabetes Mellitus, in Allbutt's *System of Medicine*, vol. iii. 1897, p. 227), in referring to the waters of Neuenahr, gives common salt amongst the three ingredients he selects as worthy of mention. The amount present in the Grosser Sprudel is one gramme in the litre, according to Fresenius and Hintz, that is, only seven grains in the Imperial gallon. We have not thought it necessary to note this minute quantity, but the possibility that it may ultimately be shown to have some importance must be admitted.

Defects in classification

A similar difficulty often arising is that of deciding what proportion of an ingredient must be considered as the necessary standard to justify the classification of a given mineral water in some particular group. In this respect it is impossible to exactly follow any strict rule, for old customs must to some extent be respected. Let us take bicarbonate of iron waters as an example. We have considered that the presence of ·02 grammes of bicarbonate of iron in the litre (1·4 grains in the Imperial gallon) qualifies a water for being mentioned

in the chalybeate group. On the other hand, some waters have, for the sake of old custom, &c. been placed in this group, though the amount of iron they contain is decidedly less than the standard we have fixed on.

No classification of natural mineral waters, however elaborate, can be really perfect; for, in their constituents and the relative proportion of the constituents, they present infinite varieties. The classification which has been here adopted is, however, believed to be that which is practically found to be most convenient for reference and memory. Several of the spas should be mentioned under two or three different groups, either on account of the same spa possessing mineral springs which belong to different groups, or on account of a single spring in the character of its active chemical constituents falling between two groups.

CHAPTER III

ACTION OF MINERAL WATERS ON THE BODY IN THEIR EXTERNAL AND THEIR INTERNAL EMPLOYMENT

EXTERNAL USE

Mineral waters when not rich in salts and gases, if applied in the form of baths (this term being used in its broadest sense to include the various forms of douches,[1] &c.), exert probably nearly the same effect as simple water would when applied in the same manner and at the same temperature. The effects of the external application of simple water have been already discussed (Chapter I). Most mineral water baths are either naturally warm, or are artificially warmed for use; warm and tepid baths promote and equalise the circulation of blood in the cutaneous vessels, macerate the epidermis and have a greater cleansing effect (especially the alkaline baths) than cold baths; they thus also promote the excretion of the cutaneous glands. This diaphoretic effect is, of course, much increased in very hot baths and in natural vapour baths (Monsummano in Tuscany,

[1] The various *local* external uses which mineral waters have been put to at one spa or another are very manifold. Amongst them are, firstly, all kinds of ordinary local douches, the local vapour bath (Berthollet system), the local douche massage, the rectal douche ('douche ascendante'), the vaginal douche ('douche interne'), and the perineal douche. At many spas the waters are employed for gargling, for nasal douches, for pharyngeal douches, and sometimes for eye douches, and for spraying the pharynx, eye, or skin of the face. Mineral waters have likewise been employed for lavage of the stomach (as at Vichy), and even for washing out the urinary bladder. In the majority of these cases probably ordinary water (medicated or not to suit the case) would answer the requirements equally well.

Battaglia not far from Padua, the Solfatara, the Stufe di San Germano, and the Bagni di Nerone near Pozzuoli, Cransac in France, &c.).[1] Very many mineral water baths are given at tepid temperatures; such a bath constitutes a medium of uniform temperature enveloping the body, and in the case of weakly mineralised, non-gaseous waters, acts in great part by its soothing effect on the peripheral nerve-endings in the skin, equalising the distribution of blood, &c.

Absorption from baths

In the course of a bath it has been found that hardly any water is absorbed through the skin. Increased diuresis, when it follows baths, must be caused, firstly, by diminished loss of fluid through the skin, and, secondly, by reflex vaso-motor effects due to stimulation of the cutaneous nerve-endings; at one time, however, it was taken as evidence that much water had been absorbed into the circulation from the bath. Salts dissolved in the bath were formerly likewise supposed to be absorbed through the skin, but experiments have failed to prove this. Doubtless they may pass through any portion of mucous membrane with which they come in contact, but are not absorbed, in any appreciable amount at least, by the healthy skin.[2] Salts

[1] Most spas possess arrangements for giving hot vapour baths, general and local. In many cases the hot vapour baths, although the chambers in which they are given are not natural caverns like that of Monsummano and other Italian 'stufe,' are still called 'natural,' because only the natural thermal water is used to produce the hot vapour. At some institutions local douches of hot vapour are likewise employed either alone or combined with a general hot vapour or hot air bath.

[2] The absorption of drugs when applied to the healthy skin in the form of ointments or oils cannot be adduced as evidence against this, for these are rubbed or pressed into the skin. Mercury is so easily volatilised that when several patients are being treated by mercury baths or inunctions other patients in the same room may present signs of mercurialism. There may, however, be great differences in regard to cutaneous absorption in different individuals, for there can be no doubt that compresses of carbolic acid solution, applied to quite healthy skin, sometimes lead to absorption of carbolic acid into the circulation (as shown by the urine), and occasionally, even, give rise to some of the symptoms of carbolic acid poisoning. These results may depend partly on idiosyncrasy, but are doubtless in part due to the removal of

dissolved in the bath water may, however, penetrate into or be imbibed by[1] the epidermis (especially if the skin is comparatively free from greasy material, as the palms of the hands and the soles of the feet are owing to the absence there of sebaceous glands), and by coming in contact with the outermost nerve-endings, impart a stimulating effect to the bath. The special stimulating effect of brine baths ('Soolbäder') is, of course, due to this action. Thus, in ordinary brine baths the degree of stimulation, as far as any individual patient is concerned, must vary according to the percentage of common salt (and other salts when Mutterlauge is added) in the mineral water, and according to the temperature and duration of the bath. Non-gaseous brine baths can be well imitated artificially.

Effect of gases in bath-water

Gases dissolved in a bath may pass into the circulation, as has been proved in the case of sulphuretted hydrogen gas. That the sulphuretted hydrogen absorbed in this way from the water of sulphur springs is sufficient in quantity to have any therapeutic effect is very doubtful. Still less is it likely that the free carbonic acid gas, in which some baths are rich, can exert any action by absorption through the skin, for owing to the pressure of the CO_2 already present in the blood, very little more is likely to enter from the bath water through the skin. Some of it may be inhaled as it escapes from the bath, but the special stimulating effect of gaseous 'iron baths,' such as those of Spa, Schwalbach, &c. is probably chiefly due to the mechanical effect of the bubbles of carbonic acid gas. Far from being absorbed, the small bubbles may be seen to collect in myriads on the immersed part; then larger bubbles begin to be formed by the coalescence of smaller ones, and these creep along

the sebaceous material from the skin by soap and water or ether before applying the antiseptic compresses in question.

[1] Skin eruptions following bathing in salt or sea water may partly perhaps be due to particles of salt remaining in interstices of the epidermis after drying the body.

the skin towards the surface of the bath, giving rise to a peculiar sensation of tickling, prickling, and warmth, and exercising a mechanically stimulating action on the endings of the cutaneous nerves. The stimulating effect of the warm gaseous salt baths of Nauheim and Oeynhausen is partly due to a similar action of the gas, and it is this effect of the gas that enables gaseous baths to be taken at a somewhat lower temperature than baths of non-gaseous waters, without giving rise to any sensation of cold. Baths of other gaseous effervescent mineral waters might to some extent be employed in the class of cases treated by the Nauheim baths (see under 'Nauheim'). Thus the tepid gaseous waters of Salins-Moutiers and of Royat might be so used, as well as the cold gaseous waters of Spa, Schwalbach, St. Moritz, Marienbad, Tarasp, Kissingen (Schörnborn-Sprudel), &c. if properly warmed. Artificial 'Thermal-Soolbæder' are made by various (Lippert, Keller, Sandow, Guaglio) methods of producing a carbonic acid effervescence in warm salt baths.

To explain the action of the Nauheim baths and of warmer baths[1] (more weakly mineralised), in cardiac affections, it has been suggested that the vagus nerve is reflexly stimulated, and that thus a tonic effect is produced on the heart, giving rise to a temporary alteration in its movements, and that this may have a beneficial influence on the cardiac nutrition, comparable to that which mild gymnastic exercise brings about in the case of voluntary muscles. The ultimate good effect of a course of these baths is probably partly due to an increased power of excreting the waste products of metabolism, which a deficient circulation has allowed to accumulate in the blood and tissues of the body.

[1] In this connection it may be remembered that Dufresse de Chassaigne wrote in 1859 on the effects of the hot baths of Bagnols in chronic cardiac affections, and in 1886 Dr. L. Blanc of Aix-les-Bains published a paper on thermal treatment in cases of rheumatic heart disease, a subject which he had already alluded to in an earlier paper. The special advantage which can be claimed for the Nauheim baths is that, owing to the effect of the carbonic acid gas, they may be administered at a lower temperature than baths of non-gaseous mineral waters.

General conclusions

If we shortly sum up the action of mineral water baths, we come to the following conclusions. They serve to keep the skin clean and active during the cure, and, in fact, to maintain it in the best possible condition. They exercise (especially those containing common salt or much carbonic acid gas) an indirectly tonic action on the circulation and the general metabolism, promoting elimination by the kidneys of toxins and waste products, and thus preparing the tissues for the assimilation of fresh nutritive material. In this way the action of most mineral water baths and douches can be explained, whether simple thermal, gaseous thermal, sulphurous, muriated or muriated-sulphurous, notably their effect in scrofulous, anæmic and various cachectic conditions, as well as their powerful adjuvant action to specific treatment in cases of syphilis. In gouty conditions and the uric acid diathesis, and in persons who have overfed and led a too sedentary life, their eliminative action is perhaps the most important. In irritable conditions of the nervous system the soothing influence of the less hot indifferent thermal waters, and in neuralgic and painful affections the analgesic effect of the very hot waters, is most sought after. In chronic cutaneous affections we must ascribe the action of baths partly to their indirect influence on the general nutrition, as already mentioned, and partly to their effect on the cutaneous circulation, and their macerating, tonic, or mild antiseptic action on the skin, accordingly as the water used is simple thermal, muriated, sulphurous, or muriated-sulphurous, &c.

Gas baths and douches

It may here be mentioned that gas baths of carbonic acid have been, and are, employed at some spas, the gas obtained from the mineral water being made use of for the purpose. The patient sits thinly clothed in an atmosphere of the gas, but either by a partition around the neck or by a properly placed overflow pipe care is taken that none of the gas be inhaled ; the gas has likewise been employed as a local bath or douche to various

parts of the body. In this form of local douches carbonic acid is said to have an anodyne effect in facial and temporal neuralgia, sciatica, &c. provided that the skin over the painful parts is kept moist during the application of the gas. In the form of vaginal douches, the gas is said to be useful in some cases of vaginismus without inflammation, and to promote healing in cases of chronic ulceration[1] of the cervix uteri. Carbonic acid has been likewise employed as a pharyngeal douche in chronic granular pharyngitis, and for inhalation in cases of pulmonary emphysema.

Baths of sulphuretted hydrogen gas, or rather of a mixture of gases comprising sulphuretted hydrogen, are sometimes employed in various cases. The utility of all such gas baths remains doubtful.

Peat and mud baths

Peat baths and mud baths are employed at a great number of spas on the Continent ('Moorbäder,' 'bains de tourbe,' 'Mineral-Moorbäder,' 'Eisen-Mineral-Moorbäder,' 'ferruginous peat baths,' 'Schlammbäder,' 'bains de boue,' 'Mineral-Schlammbäder,' 'Schwefel-Moorschlammbäder,' 'Sulphur mud baths,' 'Salz-Schlammbäder,' 'Salt mud baths,' 'Marine mud baths,' 'Salz-Schwefelschlammbäder,' &c.). The peats and peaty earth used for baths consist of decaying plant matter and soil; some of the peats are very rich in soluble salts, notably sulphate of iron, and contain free acids, such as sulphuric and formic acid. The disintegrated peat or turf of Franzensbad, when ready for use in the baths, is said to contain as much as 25 per cent. by weight of substances soluble in water, amongst which the large amount of sulphate of iron is considered especially important. The ferruginous peat of Marienbad is said to be even richer in iron. Thus the Marienbad peat claims 9 to 15 per cent. oxide of iron; the peat of Lipetsk, in Russia,

[1] In contradistinction to this we may mention that a powerful healing action has been claimed by G. Stoker for local baths of oxygen in ordinary chronic ulceration of the legs, &c. A similar healing action has been claimed for ozone and peroxide of hydrogen.

9·4 per cent.; that of Franzensbad, 8·8 per cent.; that of Steben, 7 per cent.; that of Cudowa, 4·4 per cent.; that of Elster, 3·3 per cent.; and that of Pyrmont, 2·4 per cent. Peat baths are prepared for use with the mineral water of the locality, and artificially heated to the temperature required. For mud baths a substance is obtained from the thermal springs (the 'fango' of Battaglia), or from their neighbourhood (as at Saint-Amand), consisting of mineral salts, organic matter and material derived from the neighbouring soil. At some spas (as at Dax) the mud used for the baths is formed by the action of the thermal water and living algæ and other organisms on material deposited from periodical inundations of the river. The 'Schwefel-Moorschlammbäder' of Nenndorf, Meinberg, Wipfeld, &c. are made by the mixture of a sulphurous mineral water with a peat-like mud. Mud baths containing much common salt (Salz-Schlammbäder or Salz-Schwefelschlammbäder) are employed at Ischl and some 'Soolbäder.' Salt mud baths are likewise employed in Odessa, the Crimea, and various places on the Black Sea, along the northern shore of which the brine lakes, or 'limans,' are situated, from which the mud is obtained. The mud is considerably denser than the peats used at Franzensbad and Marienbad.

Action of peat and mud baths

These baths act as very large poultices to the surface of the body. Besides their thermal action, the effect of the weight on the cutaneous circulation doubtless exercises some effect, and the sulphate of iron and the other salts and acids exercise a stimulating effect on the cutaneous nerve-endings. They are employed in chronic rheumatic affections and rheumatoid arthritis, muscular pains, sciatica, local anæsthesia associated with sciatica, &c., remnants of inflammation in the pelvic organs, &c. The continuous uniform pressure on the skin (perhaps best obtained by prolonged mud baths) exercises, according to H. Thiroux, of Saint-Amand, a decidedly favourable action in trophic disturbances connected with varicose veins of the lower extremities. The upper part of the

thorax should, as a rule, not be immersed, and in diseases of the heart and lungs these baths are contra-indicated, for the weight of the bath pressing on the abdomen and lower part of the thorax may give rise to respiratory difficulties. After the bath is over complete rest for a short time is advisable. The action of mud baths is similar to that of peat baths, but they are more fluid.

Local peat baths and mud baths resemble the application of poultices to the diseased or painful part. They are preferable to the general baths in several conditions: in patients with considerable cardiac affection, atheroma or arterio-sclerosis, and when a tendency to cerebral hæmorrhage is feared; also in very feeble and anæmic patients, and when a part, such as the neck, is affected which cannot well be immersed in the general baths. The 'fango' of Battaglia and other North Italian spas is much employed in the form of local applications. At Loka and some places in Sweden a sort of massage with cold mud is employed. At Sandefjord, in Norway, a salt mud from the coast is applied like a hot poultice, or used for rubbing parts of the body, as at Lysekil in Sweden. Mud baths are likewise employed at several places near the shores of the Baltic, as at Hapsal, in Esthonia, and Arensburg, in Livonia.

Sand baths

At some health resorts local or general 'sand baths' are employed; the island of Ischia has been especially noted for their use, and they have been introduced at Dresden, at Koestritz, and at Lavey, in Switzerland, and at some other places. Baths in hot dry sand act doubtless somewhat similarly to local or general hot air baths in chronic neuralgias, rheumatoid arthritis and stiff joints resulting from former inflammation or injury; they were used a long while ago, but have lately received proper scientific attention.

INTERNAL USE OF MINERAL WATERS

Internal use of

The effect of drinking indifferent thermal waters much resembles that of drinking an increased amount of

simple thermal waters

ordinary pure water, and the therapeutic use of this has already been discussed in the chapter on Hydrotherapeutics (Chapter I). It must however be remembered that the warmth of these springs makes some difference, for warm water naturally abstracts less heat from the body, and is more easily passed on through the pylorus than cold water; in many persons it increases the action of the bowels less than cold water. Moreover, the extreme softness of some simple thermal waters must be considered, if we remember that the internal use of distilled water has in some cases a slightly different action from that of ordinary moderately hard spring water. The remarkable action described, however, as being occasionally produced by drinking a single glass of some indifferent thermal water must be ascribed either to the imagination of an excitable patient or to a temporary reflex effect on the circulation accompanying the mere act of drinking or sipping.[1]

Common salt

Common salt is a normal constituent of the body. Moderate doses stimulate the gastric mucous membrane, increasing the secretions, and especially favouring diuresis. The general nutrition is if anything improved by moderate doses, for sodium chloride seems to promote absorption and assimilation of nutritive material, whilst its action in increasing catabolism remains uncertain. Often, doubtless, as Von Noorden and C. Dapper have recently shown, much of the effect of courses of muriated waters on the albuminous metabolism and body weight depends on, and can be regulated by, the kind and amount of diet prescribed during the cure. Large doses (above five drachms, or even less, daily) may

[1] Kronecker found that taking a liquid in numerous small sips temporarily abolishes the inhibitory action of the vagus nerve on the heart. Brunton even suggests that it may be the sipping, which gives Karlsbad water part of its effect on the liver, when it is taken at the spa itself, since Rutherford found that sodium sulphate had only a slight stimulating action on the liver; sipping fluids increases the secretion of bile and raises the pressure under which it is secreted. (See Brunton's *Text-book of Pharmacology*, third edition, London, 1887, p. 406.)

cause gastric irritation in some persons, and very large doses give rise to severe purgation and vomiting. The laxative power of muriated waters differs widely in different individuals, just as the effect of most aperient pharmaceutical preparations does; thus moderate doses of various muriated waters, which in some persons have a decided laxative action, in other persons seem to have absolutely no such effect. Its direct action on the bowel is much increased when given in concentrated solutions, whilst its action on metabolism is greater when taken in a more diluted form.

Carbon dioxide

Carbonic acid gas (see p. 320) allays unpleasant sensations in the stomach, increases peristalsis and secretion, and thus furthers the effect of common salt waters. A large quantity, unless got rid of by eructation, may cause unpleasant symptoms either by distension of the stomach [1] or by absorption into the circulation.

Sodium carbonate

Carbonate and bicarbonate of sodium act as anti-acids, allay gastric irritation, and stimulate the flow of gastric juice. They alkalise the blood, and seem often to aid the action of iron in anæmia. They exert a diuretic action, and probably increase the action of simple water in 'washing out' the blood and tissues. Their action in bronchial catarrh has been ascribed partly to the solvent action of the carbonate, as it is secreted, on the mucus of the secretion, thus facilitating expectoration. Most of the good effects are obtained by repeated small doses, whilst large doses, at least in some individuals, may cause depression. These actions are of course modified in waters where the alkaline salt occurs associated with common salt (Chapter IX.), much carbonic acid gas, or the sulphates of sodium and magnesium, or with both chlorides and sulphates (Tarasp, Karlsbad, &c. See Chapter X.).

Sulphates of sodium and magnesium

Sulphate of magnesium and sulphate of sodium, when they constitute almost the only active ingredients of springs, impart to them a merely laxative action. This effect is largely due to osmosis. In the muriated sulphated and the alkaline sulphated waters the laxative

[1] Notably so if there happen to be gastric ulceration or old peritoneal adhesions about the stomach.

quality of the sulphate is maintained, though the presence of the chloride and carbonate of sodium considerably modifies its action.

Iron

Iron, when present in sufficient amount, especially in the less irritating form of a carbonate, exerts its beneficial action on the quality of the blood in anæmia by increasing the number of red blood corpuscles and the amount of hæmoglobin they contain. This action is often favoured when the water likewise contains sodium carbonate and carbonic acid gas. Though only very little of the total amount of iron which has been swallowed is absorbed from the bowel, some is certainly absorbed,[1] and part of the effect of the portion absorbed on the blood may, as Von Noorden suggests, be due to a power of stimulating the hæmatopoietic function of the red bone marrow. C. Genth found that courses of gaseous chalybeate waters, like most mineral waters, are able to exert a diuretic influence, and that they may also cause an increased excretion of urea.

Manganesium salt

Minute quantities of the salts of manganesium occur in some mineral waters. The salts of this metal have been supposed by some to exercise a tonic action similar to that of iron, or to increase the efficacy of iron when given simultaneously with it. By others this action of manganesium is altogether denied.[2]

Arsenic

Arsenic is present in appreciable quantities in some waters, chiefly of the chalybeate class (see Chapter XIII.), and may impart to them some of its beneficial influence in scrofula, in various kinds of malnutrition and anæmia, and possibly in psoriasis and skin affections.

Iodides and bromides

Iodides and bromides are present in many muriated waters, including Woodhall Spa, Hall in Upper Austria,

[1] Dr. A. B. Macallum, in the *Journal of Physiology*, vol. xvi. 1894, p. 268, showed that inorganic iron compounds are absorbed by the intestinal mucous membrane of guinea-pigs and other animals to an extent which varies with the nature of the compound and the quantity of it given.

[2] See 'The Causes and Treatment of Chlorosis,' by Dr. Ralph Stockman, *Brit. Med. Journ.*, 1895, vol. ii. p. 1475.

Salzburg in Transylvania, the Adelheidsquelle of Heilbrunn, Castrocaro in Italy, Wildegg in Switzerland, Salies de Béarn, Kreuznach, &c. but hardly in sufficient amount to make it certain that they exercise any therapeutic effect. A. Neisser (Balneolog. Congress, Berlin, 1897) has, however, pointed out that since the minute quantities of iodine compounds present in thyroid extract exercise an undoubtedly potent effect on human metabolism, we must not be too sure of the inertness of the iodine compounds in mineral waters. In some 'Mutterlaugen,' of course, these salts occur in more considerable amounts; in that of Rothenfelde there is said to be 12·6 per mille bromide of magnesium.

Sulphur

The action of the sulphuretted hydrogen and minute quantities of the sulphides present in sulphur waters is not easily to be estimated. The effect of the weaker of these waters is probably due to other ingredients they contain, or is that of simple thermal waters. That decided therapeutic effects are obtained from the use of the stronger sulphur waters there can be no doubt. On this subject, however, we must refer to the chapter on sulphur waters (Chapter XIV.).

Lithium salts

It is doubtful whether the lithium salts present in the waters of Baden Baden, Royat, &c. are taken in sufficient amount to produce any special therapeutic effect in gout, &c.

Calcium chloride

Chloride of calcium, which has been thought to be of use in scrofulous enlargements of glands and other scrofulous affections,[1] in hæmophilic conditions,[2] in various kinds of pruritus,[3] and in exophthalmic goitre,[4] is present in several muriated waters, and forms the

[1] See 'The Therapeutic Actions of Muriate of Lime,' by Dr. J. Warburton Begbie.—*Edinburgh Med. Journ.*, July 1872, vol. xviii. p. 46.

[2] See 'On the Treatment of Hæmorrhages and Urticarias, which are associated with Deficient Blood Coagulability,' by Prof. A. E. Wright, of Netley.—*Lancet*, January 18, 1896.

[3] See 'On the Pathology of Itching and its Treatment by Large Doses of Calcium Chloride,' by Thomas D. Savill, M.D.—*Lancet*, August 1, 1896.

[4] See Dr. Lauder Brunton, in *St. Barth. Hosp. Journal*, 1897, vol. v. p. 37.

chief part of the salts contained in the 'Mutterlauge' of Kreuznach.[1]

Barium chloride

In the Llangammarch Wells of Central Wales, nearly 0·1 per mille chloride of barium is present. Barium chloride in very small doses is said to increase the strength of the heart's contraction whilst diminishing its frequency. It likewise occurs in several more strongly muriated waters (Kreuznach, &c.), where no soluble sulphates are present to precipitate it. This salt is associated with iron in the chloride of iron spring at Harrogate, and with sulphur at the old sulphur well of Harrogate.

Earthy salts

In the calcareous and gypsum waters, the carbonate of lime has an anti-acid and soothing effect on the gastric mucous membrane, whilst the sulphate of lime is slightly astringent. This astringent quality need not cause constipation, for, although the intestinal secretion may be lessened, the amount of fluid ingested may be greater, and the peristalsis may remain the same, or even be increased. Usually, however, if not taken in large quantities, earthy waters exert a relatively constipating action, and the diuretic effect of the mere drinking is thus increased, for when less fluid passes off by the bowel, more has to pass off by the kidneys. When taken in very large quantities these waters often have both a diuretic and a laxative effect; to this diuretic effect is probably due some of their repute in cases of urinary gravel, &c. It is very doubtful if the lime in these waters has any special action on the nutrition of the bones, though according to Rumpf (compare p. 422) when much lime is ingested with the food, some of it remains stored up in the body.

Nitrogen, argon and helium

Nitrogen, and since their recent discovery in mineral waters, argon and helium, are generally supposed to be therapeutically inert, but amongst those who have more recently considered the subject, A. Robin and E. Duhourcau maintain that the nitrogen in thermal waters may be an active agent. On theoretical grounds one must not hastily con-

[1] In some 'Mutterlaugen,' such as those of Kissingen and Salzungen, there is less chloride of calcium, but more chloride of magnesium.

clude that these gases when dissolved in mineral waters are altogether indifferent substances, though in most cases they appear to be so. Further observations are however necessary before it can be settled that they exert any definite action.

Experimental research into the action of mineral waters

Much good work has been done in France by the investigations of A. Robin and his pupils into the action of mineral waters upon the metabolism. In regard to Dr. Linossier's discussion of this subject in the Clermont-Ferrand Congress of 1896, Drs. Doyon and Spillmann in their French edition of our work have added a long note. They point out that the means at our disposal are at present too limited to furnish a correct idea of the intimate results of treatment; for it is the effect on cellular metabolism, that is, on the nutritional changes of the living cells of the body, which constitutes the chief action of mineral waters, whereas many of our ordinary pharmaceutical preparations owe their power to some antagonistic effect on the parasites of the body. Empirical results have still largely to be relied on in treatment by mineral waters, though valuable hints have already been gained by experimental methods of investigation, as, for instance, by making deductions from a comparison of the effects of mineral waters on the metabolism of healthy individuals with the pathological deviations of nutritive processes observed in the various affections treated at spas. They point out that a fixed diet should be commenced several days, not immediately, before the investigation of the excreta is commenced, and that the investigation should be continued during periods before, during, and after the use of mineral waters. In fact, it is the more or less continued *after-effects* on the metabolism which they consider to be the prominent characteristic of balneo-therapeutic treatment.

It is impossible to estimate exactly the effect of a given mineral water merely by summing up the respective effects of the ingredients which a chemical analysis shows it to contain, nor is it possible to explain the whole action of the water on a diseased person by the

results of its experimental use in healthy subjects. In order to render our knowledge of the working of mineral waters more certain, additional and extensive investigations should be carried out on the metabolism of patients whilst under treatment, as Von Noorden, Dapper and K. Grube have recently pointed out.

Inhalation of mineral waters

Inhalation treatment.—Besides being taken by the mouth the waters of some spas, especially those containing chloride and carbonate of sodium and sulphur, are inhaled for affections of the respiratory system, in order, if possible, to obtain the local action of the mineral water on the affected mucous membrane. When the pharynx or the naso-pharynx is the part affected, a coarse spray may be inhaled, so also when it is desired only that the spray should reach the upper part of the larynx. In cases, however, of chronic bronchitis, when it is desired that the spray should reach the mucous membrane of the bronchial tubes without exciting cough, it is necessary, especially when there is laryngeal irritability, to have the mineral water exceedingly finely pulverised. This is best effected by one of the methods which fill the entire room with the pulverised water. In such a room the patients can sit comfortably and inhale the spray which pervades the room.

Gradirhäuser

Another method of inhalation is that of sitting close to 'Gradirhäuser,' structures which were originally used merely for the manufacture of common salt from salt springs. The Gradirhäuser at Kreuznach, Kissingen, Reichenhall, &c. are enormous fences of twigs, down which the salt water is made to trickle from top to bottom. There are walks and seats arranged for the patients at the sides of some of these structures, and patients usually sit on the side away from the wind. Doubtless, in addition to watery vapour, particles of the salt water itself, in the form of a fine spray, are inhaled. A brine fountain in the neighbourhood, such as is present in the Kurgarten of Reichenhall, will increase the amount of salt water spray present in the air. As

Drs. Doyon and Spillmann point out in their French edition of this work, the effect of the ozone produced by these arrangements must likewise be taken into account.

Inhalation of gases

The gases given off from mineral waters, especially sulphuretted hydrogen, nitrogen, and carbonic acid, are sometimes inhaled, but it is very doubtful if any real therapeutic use has been obtained by this method.

Other factors in spa treatment

So far we have discussed the physical effect of baths and the pharmaco-dynamic action of mineral waters when taken internally. These effects of the mineral waters might often be obtained by their judicious employment at home, or even, to some extent, by the employment of artificial mineral waters,[1] but treatment at spas depends for its success also on other factors, and it is our intention in the following chapter to take into consideration the mental repose or change in mental occupation, the change in climate, surroundings, mode of life and diet, accompanying spa treatment.

[1] The manufacture and serious employment of artificial mineral waters for internal use was introduced by Prof. F. A. A. Struve in 1820–21 at Dresden, and in 1825 he founded the 'German Spa' at Brighton, which originally had a pump room kept open in the morning to enable visitors to drink the imitation waters of celebrated foreign spas, just as they would do at the spas themselves. The 'German Spa' is now simply a factory for the making of artificial mineral waters. Struve's book, *Ueber Nachbildung der natürlichen Heilquellen* (Dresden, 1824–6), remains one of the best works on the subject. O. Ewich, however, and since him others, have carried the process still further, and employed artificial mineral waters, not exactly identical with any natural ones, but having their constituents specially adapted to suit certain classes of patients. Artificial mineral waters, except seltzer and other table waters, are at present hardly employed in England at all.

Some mineral waters are likewise imitated for external use. Thus the various natural brine baths can be effectually imitated by dissolving the proper amount of common salt in ordinary water, with or without the addition of some exported 'Mutterlauge.' Natural sulphur and muriated sulphur baths have also been imitated. In recent times gaseous effervescent baths have been artificially produced (systems of Lippert, Keller, Sandow, Guaglio), which, with a certain amount of success, imitate the Thermal-Soolbaeder of Nauheim and the gaseous 'irons baths' of chalybeate spas.

CHAPTER IV

THE INFLUENCE OF CHANGE OF AIR AND DIET AND HABITS IN THEIR CONNECTION WITH SPA TREATMENT — ORDINARY MEDICAL AND SURGICAL TREATMENT AT SPAS—MUSCULAR EXERCISES AND MASSAGE IN CONNECTION WITH SPA TREATMENT

It is always very hard in estimating the effects of spa treatment to separate that which is due to the mineral waters from that which is due to change of air, diet, mode of life, and mental occupation. If these latter did not contribute largely to the good results obtained, and if the results were merely due to the internal and external use of spa waters, it would be possible in most cases to carry out the treatment at home with the aid of imported or even artificial mineral waters. As a matter of fact the home treatment often fails, or its result falls far short of that obtained at the spas themselves. Nor is this to be wondered at when we consider the effect alone of 'change of air.'

Change of air, &c.

Every reader has probably experienced some of the effects attributed to 'change of air.' It would be quite unnecessary to describe, if that were possible, what all feel when from the confined air of rooms or offices in some large smoky town, they go for their holiday and inspire the fresh fragrant country air, or the invigorating sea or mountain breeze.

Sun baths, Light baths, Air baths

During the holiday much time is usually spent in the open air; sunlight, including the invisible 'chemical' rays, which probably penetrate more deeply than

ordinary light rays, plays some part in the good effect, probably increasing the general nutrition of the body, as well as rendering the air more aseptic.[1] The maximum effects of mere light and pure air are obtained at some places, such as Veldes, where during the warm weather the patients, practically undressed or very lightly clad, take actual 'sun baths' or 'air baths.' (The warmth and light of 'sun baths' are now even artificially imitated by electric light baths.[2]) The use of 'open air,' 'pure air' and general climatic treatment in pulmonary tuberculosis, one of the greatest scourges of humanity, is fortunately already widely known; this subject and 'sun baths' are mentioned here to illustrate how much influence climate and change of air must obviously have in ordinary spa-treatment.

Climate, altitude, situation and surroundings of spas

The elevation of some spas above the sea-level gives them a real mountain climate. St. Moritz, in the Upper Engadine, is about 6,000 feet above the sea; Panticosa, in Spain, Loèche-les-Bains, in Switzerland, Bormio, in Italy, and some others, are situated at elevations of 4,000 to 5,500 feet. Many other baths lie at considerable elevations. Buxton, in Derbyshire, has an elevation of 1,000 feet, and its relatively high and open position imparts a delightful freshness to the air. The upper portion of Llandrindod, in Wales, though it has only the very moderate elevation of about 700 feet, owing to its

[1] Dr. N. R. Finsen, of Copenhagen, has had the ingenious idea of utilising the antiseptic action of concentrated light rays (both from the sun and from the electric arc) in the treatment of lupus vulgaris. The chemical rays might possibly penetrate the semi-gelatinous material of the lupus granulations and reach the tubercle bacilli, which are the cause of this disease. Some apparently satisfactory results are figured by Finsen in *La Semaine Médicale*, 1897, No. 59, p. 468.

[2] Concerning electric light or 'radiant heat baths,' the reader may consult the article by Dr. J. H. Kellogg, Superintendent of the Battle Creek Sanatorium, Michigan, in *Fortschritte der Hydrotherapie, Winternitz Festschrift*, Vienna and Leipzig, 1897, p. 126; also the description by Kuehner in the *Internat. klin. Rundschau* for April 18, 1894. Dr. W. S. Hedley of London has likewise devised a simple form of apparatus with electric lights for the local administration of radiant heat (see *Journal of Balneology*, January, 1898, p. 88).

open situation on a kind of moorland, has a bracing climate, equal to that of many higher localities on the Continent. It will be here impossible to enter at further length into the pure climato-therapeutic influences of spas. (See Chapter XVIII.)

The situation and surroundings of a spa are important in other ways than in determining the amount of protection from wind, insolation and warmth. It is important that there should be beautiful scenery in the neighbourhood and that there should be suitable roads and paths in different directions, many of them on nearly level ground, but others so arranged as to necessitate a certain amount of gentle climbing exercise. There should be an abundance of woods or avenues where patients may rest or walk protected from the heat of the sun. The slopes surrounding many of the Continental spas, especially the German ones, are richly wooded; the forests are carefully kept, and, in some cases, form part of the property of the spa, and are devoted to the use and enjoyment of the visitors. Certainly in the acquisition and maintenance of neighbouring shady walks, or of planting them out, if they are not there already, several English and French spas would do well to follow the example of some of their fortunate rivals.

In selecting a spa the season when the patient requires treatment must be considered, a spa being selected at which the climate during that part of the year is at its best.

Psychical influences in spa treatment

The good effects of taking an ordinary holiday, usually attributed to 'change of air,' are doubtless often in part psychical, and due to change in mental occupation. The dull routine of office work, and the excitement and worries of commercial enterprise or professional life, are alike laid aside. The mind is occupied in other ways. To many country life has something of the charm of novelty; to others it recalls pleasant recollections and re-awakens earlier interests. Rest, quiet and soothing scenery are usually most keenly relished by

those who have been hardest worked, and are often of great importance to patients of excitable temperament.

If this psychical action is needed on ordinary holidays, it is still more important during spa-treatment. Though occasionally it may do good, a course of powerfully-acting mineral waters cannot be recommended in most cases whilst the patient has to attend to a worrying business or social fatigues. Sometimes the only way to ensure that a patient should keep away from business cares is to insist on his going to a health resort at some distance for treatment.[1]

There should, however, be no *ennui* at spas, and this is often well guarded against at foreign spas, where bands and concerts in the open air are provided and social entertainments looked to. Patients at spas should be made as cheerful as possible, and their thoughts should be diverted from their ailments by healthy mental influences. Neglect of this factor in spa-treatment has led to want of success at some spas, whilst the due recognition of its importance has contributed largely to the success of other spas. In the treatment of chronic diseases the mind can and should be used as a most powerful agent. Change of occupation and amusement act as psychical tonics or alteratives; they doubtless promote the nutrition of nerve-cells in the cerebral cortex, and through improved nutrition of the brain cause improvement of nutrition and function in distant organs.

In many persons, especially those with gouty and rheumatic tendencies, and whose occupation demands much brain work or favours sedentary habits, a condition of general fatigue and nervous exhaustion is likely sooner or later to occur, so that a holiday becomes absolutely

[1] The journey, however, must not be made too fatiguing by continuous 'through' travelling. If the health resort be distant, the journey should be interrupted by rests of a day or more at suitable localities; by not observing this point patients are likely to arrive at their destination in a state of fatigue which renders a considerable period of rest advisable before commencing spa-treatment.

necessary. How much of this 'break-up' is due primarily to mental overwork, and how much to the accumulation of waste products in the system from insufficient exercise or too liberal diet, varies doubtless in different cases. The management of such conditions (which should be prevented by regimen and taking a holiday in time) consists in mental rest or change of occupation on account of the nervous condition, with appropriate treatment (ordinary open-air exercise, diet, some form of spa-treatment) for the disordered state of the general metabolism. When spa-treatment is adopted in such cases, a sufficient total period of holiday must be secured by insisting on an 'after-cure' at some suitable climatic station (see Chapter XXI.).

Regulation of diet and mode of life

Another advantage of treatment at a spa over treatment at home is a certain amount of routine in the treatment, not to be regarded as a thoughtless, 'mechanical' method of treating all patients. A patient finds it easier to change his diet and habits when others are doing the same thing; it becomes, indeed, almost necessary to do so. Thus, over-indulgence in food (and perhaps alcohol), hurried meals at irregular times, and late hours, give place to early rising, regulated diet, regular meal-times, and going to bed early. Regulation of the diet is particularly difficult to effect at home, and what a large part this plays in the treatment of obesity and glycosuria at Marienbad, Karlsbad, &c. is generally acknowledged (see Chapter V. p. 55.)

Enough has been said to show how many advantages treatment at the spas themselves has over treatment by mineral waters at home.

Ordinary medicinal treatment at spas

As a general rule, ordinary pharmaceutical treatment is employed as little as possible at spas, patients rightly or wrongly thinking they have had enough of drug-treatment before they are sent to spas, or having a special dislike to medicines.

In certain cases, however, it may be questionable whether the good results obtained by spa-treatment are

due not so much to the waters as to ordinary medicinal treatment employed simultaneously. For this supposition there is doubtless some ground. Thus the reputation of Aix-la-Chapelle and some other French and German spas in syphilis has been due, in great part, to the ordinary medical treatment employed there and to the attention paid to the subject by the local doctors; the reputation of Karlsbad in diabetes is partly due to similar causes. Certain spas owe some of their reputation in gynæcological affections to the skilful local treatment employed by the doctors, and Wildungen is famous for the surgical treatment of urinary diseases.

In other cases the reputation of the spa is due not so much to the water as to the energetic hydrotherapeutic measures, special exercises, massage, &c. employed there. This is the case, to some extent, at Aix-les-Bains for joint affections, and to similar causes Nauheim owes much of its recent celebrity in heart affections.

Importance of the local medical men

What has been said in the last paragraphs serves merely to emphasize the fact that the knowledge, capability, and energy of the local medical men contribute largely to the success of spa-treatment, and this factor must always be taken into consideration when selecting a spa for patients.

Specialisation of spas

Paracelsus believed in a specific action of different mineral waters in special diseases. Partly from tradition, partly on well-established balneo-therapeutic grounds, but in great measure also, as has just been explained, owing to the knowledge and exertion of the local doctors, many spas have obtained a widely spread popular repute in the treatment of particular affections. By the observations and special studies of local doctors, and of doctors who send patients to the spas, the indications for certain spas have gradually become more sharply defined. This 'specialisation of spas' is most noticeable in France, where the writers on the subject, with the characteristic liking of the French for order and classification, seek to define more and more clearly

what the exact class of cases is that each spa is particularly suited for. It may perhaps be questioned whether the theoretical grounds on which these exact limitations are founded are yet sufficiently established for building any very elaborate scheme. The resources of most spas can be greatly varied to suit different kinds of cases. However the tendency to specialise spas more definitely is on the whole likely to lead in the right direction, and is in many cases convenient for all concerned—a kind of division of labour, in fact.

Massage in spa treatment

Massage and active and passive exercises in connection with spa-treatment.—Massage is now occasionally employed in most spas: local massage (with or without general massage) in the treatment of stiff joints, sciatica, lumbago, neuralgias, some kinds of headache, habitual constipation, abdominal plethora, some cases of dyspepsia, and some chronic catarrhal conditions and states of disordered function of the abdominal viscera; general massage in the treatment of patients for whom much voluntary muscular exercise is temporarily or permanently unsuitable or impossible. In the latter cases general massage is intended, to some extent at least, to supply the place of voluntary exercise.

At some spas, as at Aix-les-Bains, massage is much employed simultaneously with the thermal douche; at other spas the thermal douche is applied so forcibly as to produce a kind of massage effect. At most health resorts massage, when thought necessary, is administered independently of the ordinary thermal treatment.

Swedish gymnastics and Nauheim exercises

Institutions for Swedish gymnastics have been established at many foreign spas, furnished with Dr. G. Zander's medico-mechanical appliances for passive movements and for voluntary muscular exercises with graduated resistance. Institutions of this kind are to be found at Aix-la-Chapelle, Wiesbaden, Baden-Baden, Wildbad, Karlsbad, Ragatz, &c. Here graduated movements of all kinds may be prescribed in order to exercise particular joints and particular sets of muscles.

Swedish gymnastics without these special mechanical appliances, according to the original system of P. H. Ling, are practised under strict medical superintendence at Homburg, Baden-Baden, and other localities, including several French spas. In the 'Schott' treatment for heart affections at Nauheim, a form of 'Widerstands-Gymnastik' (movements with resistance), under the direct superintendence of a doctor or skilled attendant, has been introduced. In the systems of Ling and Schott the resistance is supplied by the hand of the superintendent, whereas in Zander's system it is supplied by the weights and levers of his machines.[1]

Graduated walking, climbing and cycling exercise

Graduated voluntary exercise, in the form of the 'Terrain-Cur,' was some years since largely introduced into spa-treatment, especially at German spas (such as Reichenhall, Baden-Baden, &c.) Paths have been made on the hills and slopes around the spas, which involve a varying amount of up and down 'climbing' exercise to those who go along them. Maps of the different walks at some health resorts have been made, for the use of both doctors and patients, and in selecting a series of walks for his patient, the doctor can regulate the time, the length, and the amount of climbing exercise for every day's morning or afternoon walk. In suitable districts graduated cycling exercise[2] may often, if preferred, replace part of the walking, at all events in the less serious class of cases; indeed, in some cases of

[1] Other machines have been introduced by Zander for passive movements and massage.

[2] Dr. Martin Siegfried (*Deutsch. Med. Wochenschrift*, 1897, No. 27) has specially drawn attention to the therapeutic use of the tricycle in various affections as an instrument for graduated active and passive movements of the lower extremities. For this purpose he employs a tricycle the treadles of which can be adjusted to revolve in a small or large circuit as required. For passive movements the tricycle may be pushed or dragged by assistants, the patient's feet merely resting on the pedals. A support for the patient's back is required in some cases. Dr. Siegfried also occasionally makes use of an arrangement, by which the upper extremities may replace or aid the lower extremities in driving the machine.

stiffness in the joints the former method of exercise may be found the more useful of the two. The arrangements for the 'Terrain-Cur,' as it is termed, were introduced after the writings of Professor M. J. Oertel, of Munich, in 1886, had directed attention to his method of treating chronic heart affections by gradual climbing exercise ('Ueber Terrain-Curorte zur Behandlung von Kreislauf-Störungen,' Leipzig, 1886). The use of exercise in certain heart affections had already been advocated by Stokes, who, writing on the treatment of 'incipient fatty diseases of the heart' (Professor William Stokes, 'Diseases of the Heart and the Aorta,' Dublin, 1854, p. 357), commences thus:—'We must train the patient gradually but steadily to the giving up of all luxurious habits. He must adopt early hours, and pursue a system of graduated muscular exercise, &c.'

Uses of exercise and massage

For the use of muscular exercise in headache associated with habitual constipation, &c. we refer to our remarks in Chapter XVIII., Section 46. Its great usefulness in many cases, by furthering the oxidation of waste products and toxic materials circulating in the blood, is undoubted, and can hardly be over-estimated. By regular exercise much may be done to prevent the premature degeneration of the tissues, those of the vascular system in particular, to which persons with an inherited arthritic tendency are specially predisposed. By judicious exercise the voluntary muscles are probably enabled to make use of the sugar circulating in the blood in glycosuric cases. On the action of regular exercise as an aid to dietetic treatment in hindering excessive development of fat in the body, we need not enter here.

A moderate amount of muscular exercise in those who are able to take it, helps the body to get rid of waste products, and promotes the healthy nutrition of all the tissues. When, owing to debility, obesity, stiff joints, or certain affections of the circulatory and respiratory systems, sufficient ordinary muscular exercise,

such as walking, has become impracticable, massage or some modified form of exercise can often be practised with advantage. It must be noted, however, that in regard to the promotion of oxidation in the body, according to the recent researches of Hans Leber and Strüve,[1] it seems probable that metabolism is only very slightly increased by massage in comparison to what it is by active exercise.

It is probable that courses of the various active and passive exercises, and of hydrotherapeutic treatment, all help to get rid of the toxic materials and waste products which have accumulated in the body. This is effected either by oxidation within the body, or by elimination in the urinary and other excretions. Dr. H. Forestier ('Med. Press and Circular,' April 8, 1891) has found that in gouty patients the excretion of both urea and uric acid in the urine is increased, when they undergo the 'douche-massage' treatment (see under Aix-les-Bains), and that towards the end of a course of treatment the quantity of urea and uric acid in the urine commences to fall to the normal.[2] Dr. A. Ranglaret ('Annales d'Hydrologie,' Paris, November, 1896, p. 491) has not only confirmed these conclusions of Forestier, but as far as his limited number of experiments go, has proved by injections into rabbits that the specific toxicity[3] of the

[1] Carried cut with the assistance of Prof. C. von Noorden at Frankfurt. See 'Ueber den Einfluss der Muskel- und Bauch-Massage auf den respiratorischen Gaswechsel,' *Berliner klin. Wochenschrift*, 1896, No. 16.

[2] In this connection it may be noted that E. Pfeiffer (*Berl. klin. Woch.* 1896, p. 248) thinks that thermal baths may be useful in deciding whether uncertain pains and joint troubles are gouty or not. According to him, after about twenty thermal baths, such as those of Wiesbaden, the daily amount of uric acid excreted in the urine is sometimes very much diminished (by its half or more), and in such cases he thinks the diagnosis of the uric acid diathesis can be made, and the symptoms be considered gouty. The same phenomenon, he thinks, cannot be observed when some other cause is at the root of the trouble.

[3] It is not improbable, as has been suggested, that the group of symptoms, known as 'well-fever,' often appearing during spa-treatment, is partly due to a temporary excess in the toxic materials circulating in the blood previously to their elimination. If this supposition be correct,

patient's urine is increased during the first part of a course of 'douche-massage.'

Massage and exercises in affections of the heart

Dr. Lauder Brunton and Dr. Tunnicliffe have lately shown ('Journal of Physiology,' December, 1894) that massage causes a diminution of peripheral resistance in the vessels of the kneaded muscles, and that hence, soon after the kneading, an increased flow of blood through the part takes place, together with a fall of the general blood pressure. During the massage the blood pressure may be slightly increased; but this slight increase is not likely to throw a great amount of extra work on the heart, such as occurs at the commencement of climbing exercise.[1] Hence, in cases where the coronary arteries of the heart are diseased, and any attempt at climbing exercise causes attacks of angina pectoris, massage may be employed as a substitute for voluntary exercise without inducing such attacks. In other cardiac cases, where for various reasons the patient can take only a very

'well-fever' may be regarded as analogous to the pains and stiffness felt at the commencement of a walking tour, or after any unusual muscular exercise in persons who are 'out of training.' [Exercise in persons out of training perhaps gives rise to the familiar pains and stiffness, firstly by inducting a too sudden catabolism in the muscles, secondly by bringing into the circulation waste products which were previously stored up in the tissues.] Bearing also in mind the analogy between the temporary pains and stiffness resulting from unwonted muscular exercise, and those often complained of by gouty, rheumatic, and anæmic persons, it is not astonishing that such patients should often complain of an increase in their pains shortly after commencing spa-treatment.

[1] Considerable rise of blood pressure doubtless occurs both in health and disease at the commencement of any form of active exercise, whether mild or violent, so long as the task is sufficient to tax the energy of the individual who undertakes it. This rise of blood pressure corresponds to the period before the 'second wind' is obtained, and is associated with subjective feelings of strain and discomfort even in healthy persons when 'out of training.' Afterwards, when the 'second wind' reaction is obtained, the peripheral resistance to the blood-flow is diminished; and Dr. G. Oliver finds that any kind of exercise leads to vaso-dilatation, and has shown that the resulting increase in the volume of the limbs can be measured. It has been suggested that during exercise some substance is manufactured in the muscles which has the same effect as vaso-dilator drugs have, when they enter the blood stream.

limited amount of voluntary exercise, this deficient amount may be supplemented by massage.

When only very little voluntary exercise is possible, it is sometimes best that it be taken under skilled supervision. In the use of Dr. Zander's machines this supervision is supplied by the medical attendant, who prescribes the exercises or who is present in the room, whilst they are performed; in the systems of Ling and Schott the supervision is supplied by the doctor or skilled attendant, who furnishes the resistance to the movements.

Dr. Brunton ('Lancet,' October 12, 1895) has pointed out why voluntary muscular exercise, in some cardiac cases, can have an advantage over general massage. During exercise the respiratory movements are increased, and thereby a kind of indirect massage is practised on the heart[1] and large thoracic vessels; the venous return being doubtless especially aided. Hence the importance of assuring, where possible, a certain amount of voluntary exercise, or of special respiratory movements, even when massage serves the main purpose. Swedish gymnastics often best supply this exercise, because in these forms the amount can be easily regulated and the movements varied as required. It is in the treatment of affections of the heart that the 'Widerstands-Gymnastik' has lately excited especial attention. (See under NAUHEIM.) We have in this chapter already referred to the probability that oxidation in the tissues is furthered more by a little voluntary exercise than by a considerable amount of massage.

[1] G. Heinricius and H. Kronecker drew attention to this massage action of respiratory movements on the heart in their 'Beiträge z. Kenntniss d. Einflusses der Respirationsbewegungen auf den Blutlauf im Aortensysteme' (*Abhandlungen d. math.-phys. Classe der Königl. Sächs. Gesellschaft der Wissenschaften*, vol. xiv., 1888, p. 427). Dr. G. Hamel notes the similar massage action exerted by the pulse of arteries on the surrounding tissues ('Die Bedeutung des Pulses für den Blutstrom,' *Zeitsch. f. Biologie*, vol. xxv., 1889, p. 474).

CHAPTER V

DAILY LIFE AT SPAS—DURATION OF THE CURE —NECESSITY FOR MEDICAL SUPERVISION— SEASONS FOR THE CURE—IMPORTANCE OF AN 'AFTER-CURE'

A FEW words may be said of the daily life of patients whilst treated at foreign spas. This must naturally vary according to the strength of the patient, his previous habits, the nature of his ailment, and the kind of spa-treatment he is undergoing ; it must necessarily be largely regulated by the spa doctor, and depends somewhat on local customs of the particular spa. A certain amount of routine is, however, often useful, for patients find it easier to follow rules when others about them are doing the same. Doubtless rules for drinking the waters, bathing, and regulation of diet, had formerly become too stereotyped at some spas, and were followed too rigidly without sufficient regard to the special condition of individual patients (see under KARLSBAD). Such local rules, which in former times were arbitrarily imposed on all persons drinking the same kind of mineral water, have in recent times been wisely modified or relaxed to suit the requirements of different constitutions.

Daily life at spas

At most German and foreign spas the patient's day begins early. He gets up at six or seven (or even earlier), drinks his water gradually, chatting and promenading, whilst a band, to the expenses of which the visitors subscribe, enlivens the Kurplatz. Breakfast consists of coffee or tea and rolls, to which, especially in

the case of English patients, a couple of eggs or a little ham, chicken, &c. is often added. This can be taken at a suitable time after finishing the prescribed amount of mineral water; the usual time will be between seven and nine, according to the hour when the patient has started his day. It is the rule to take the waters on an empty stomach, but in the case of delicate patients a cup of milk or tea or coffee can be allowed on rising; in some cases the waters may be drunk in the patient's room. Rarely it is found preferable to delay taking them until before the mid-day or evening meal.

In Germany the middle meal of the day is at about one o'clock; in France it is earlier. Concerning the daily life at a French spa, such as Cauterets, see under CAUTERETS. If baths are required, they may be taken in the morning early, after drinking the waters, or, if there is not time then, before the mid-day meal. Needless to say, they should not be taken shortly after a meal, at which time much blood is needed in the internal organs for digestive purposes. When the spa is overcrowded and the bathing accommodation not great, the time for the bath must depend on priority, and this at some spas may, during the height of the season, cause the patient great inconvenience and even harm. Open-air concerts, promenades, and occasionally pleasant excursions into the surrounding country, help to fill up mornings and afternoons until the evening meal at five, six or seven. Sometimes drinking the water a second time before the mid-day or evening meal is ordered; occasionally, especially when it is advisable that the patient should drink very little at a time, or when an unusually large daily amount is required, the water is taken three times in the day. Chalybeate waters are sometimes taken after meals or with the meals, and if a large amount of free carbonic acid gas disguises the taste of iron, they form pleasant table drinks.

Duration of the cure

There is no fixed time for the 'cure' to last. Three to four weeks is probably about the average, but this

treatment, like any other treatment, must vary according to the patient's condition and the ailment. It is absurd to think that in every chronic disorder all the good which can be done by spa-treatment can be done in twenty-one days. The time can sometimes only be settled by the medical man who is watching the progress of the case, and in many cases of chronic disease it is necessary to continue the course over six or eight weeks, or to have two courses in the same year separated by an interval of one or two months.

Importance of medical supervision at spas

Medical supervision is absolutely necessary. The progress of the case must be watched. The patient requires advice on many points, as to diet, as to the nature and amount of exercise, and the time of day at which to take it, as to when to drink the waters, and how much to take, as to temporary omission of baths or other spa-treatment on the appearance of eruptions or 'well-fever' (see p. 55), or during menstrual periods, or during intercurrent illness from chills, mistakes in diet, &c. Sometimes the doctor orders that the waters, if cold, be warmed; or, if too strong, be diluted with ordinary drinking water or milk or whey; or that their taste be improved by the addition of some gaseous water, &c. Some patients overdo the treatment by drinking excess of water, unless they are under supervision. Too much exercise is sometimes taken, a danger especially to be guarded against in the case of chlorotic girls and anæmic persons. Many patients cannot be satisfactorily treated unless they have very precise rules to follow, and this exactness can only be furnished by a doctor at the spa itself. On his guidance the result of the treatment often depends, and he should receive from the medical attendant at home an account of the patient's condition and previous treatment. By his successful general management of cases the good reputation of a spa is often largely increased.

Careless use of mineral waters

Although very large quantities of mineral waters have sometimes been drunk with impunity or apparent

benefit, even the indifferent waters should not be taken without caution and supervision. Very serious symptoms, and even death by syncope or apoplexy, have been known to follow the sudden drinking of cold water or excessive quantities of hot water.

'Well-fever'

A lesser evil of drinking too large quantities is the disturbance of the system known as 'well-fever,' 'Bad-Friesel,' 'fièvre thermale,' 'crise thermale,' or 'poussée thermale'; it may also be produced by excess of bathing or other external use of the mineral water, and consists in febrile uneasy sensations, and sometimes dyspepsia, lassitude, diarrhœa, and skin eruptions. These symptoms, which were formerly supposed to be of a critical and beneficial nature, ordinarily pass off with, at the most, a temporary cessation of the treatment or the administration of a sedative drug. At Loèche-les-Bains (Leukerbad) [1] the eruption or 'poussée' is considered still a normal accompaniment of the treatment by prolonged tepid baths, and A. Grimaud [2] maintains that a 'crise thermale' is both useful and necessary at Barèges. Well-fever may perhaps be compared to the pain and stiffness often felt even by healthy persons at the commencement of a walking tour (see p. 49). But the cause need not always be the same, and Dresch [3] explains the symptoms 'as the result of an auto-intoxication, more or less combined with an infection by the bacillus coli.'

Diet

The rules as to diet during the cure at some spas were formerly too strict and stereotyped; the same 'cure-diet' was observed no matter what the patient suffered from, the 'Sprudel-Suppe' supper of Karlsbad (see p. 181) being a favourite example of this severe dieting.[4] Articles such as butter (see Chapter X., p. 177) and tea were, without sufficient reason, prohibited in

[1] De la Harpe, *La Suisse Balnéaire*, 1895, p. 113.

[2] *Annales d'Hydrologie*, Paris, April, 1897, p. 170.

[3] *La Fièvre Thermale*, Paris, 1897, p. 9.

[4] According to F. A. Hoffmann potatoes were once forbidden at Kreuznach, because the iodine of the water might combine with the starch in the potatoes!

all cases. Doubtless such general rules suited many individuals, especially in regard to limitation of the evening meal, which is most desirable when patients have to go to bed early, and rise betimes to drink the water in the morning. Another custom formerly prevailing at some spas must have been useful in many cases, namely, that of supplying the place of the morning coffee or tea by a 'Mehlsuppe,' or by a kind of oatmeal porridge, by barley or rice soup, or by a broth made with milk or eggs.

The very strict rules of 'cure-diet,' formerly observed by all patients at some spas, have indeed been wisely relaxed. It is, however, most important that the spa physician should be able to supervise the patient's diet, as he can, to a certain extent at least, at Karlsbad. *Table d'hôte* dinners in this respect are somewhat inconvenient, and the *à la carte* system of various German and Austrian spas is on the whole preferable to the special diet tables advocated by some authorities. Many now maintain that the only diet to be observed during a course of mineral waters is that suitable to the patient's constitution and disease, and should be quite irrespective of the kind of mineral water taken. This is probably too extreme a view, for some persons find by experience that, if they are to escape attacks of intestinal catarrh, they have to be more careful in their diet when taking purgative mineral waters than when not taking any.

Seasons for spa-treatment

The season for spa-treatment is necessarily limited to the time during which the spa is open. This is mostly from May till October, although some especially French spas do not really open, or even profess to, before June. Bath in England is open all the year round, and some foreign spas, such as Aix-la-Chapelle, Amélie-les-Bains, Dax, Baden-Baden, and Wiesbaden, are likewise open throughout the year. The summer months are especially convenient for a cure, because the patient can remain the greater part of the day in the open air; moreover, on account of the warmth of the air, less heat

production and tissue metabolism are required, and therefore a better opportunity for the alterative and depletive action of mineral waters is afforded.[1] If a winter course be adopted, the patient should, if possible, have his lodging in the building in which his bath is, so as to render him independent of inclement weather; such an arrangement is possible at Bath, Aix-la-Chapelle, Wiesbaden, &c. For those who bear heat badly, it is advisable to avoid the hottest summer months at Aix-les-Bains, Aix-la-Chapelle, Ems, Baden-Baden, Wiesbaden, Neuenahr, Ragatz, and other hot localities.

Preparatory treatment

At one time preparatory treatment of a severe nature was advised before taking a course of waters. This was according to the antiphlogistic theories of the time. Preparatory treatment is still sometimes adopted, such as rest at some climatic health resort, dietetic or special medicinal treatment, but not the excessive purging, &c. of olden days. Sometimes a course of water at one spa serves as preparatory treatment to a course at another. Thus in certain conditions a course of muriated, muriated-alkaline, or muriated-sulphur waters may be useful before a course of chalybeate waters; so also a spa of moderate elevation may be recommended before one of high elevation; for instance, a course of chalybeate waters at Spa or Schwalbach may precede a course at St. Moritz.

Use of the water after leaving the spa

Sometimes, on discontinuing a laxative course at spas, such as Karlsbad or Marienbad, there may be troublesome constipation. This may be remedied by continuing the use of the mineral waters, or their salts, for some time after leaving the spa.

Importance of an 'after-cure'

Generally speaking, an 'after-cure' (German, 'Nachkur') is of the greatest importance, especially after the more active waters, such as Karlsbad, Marien-

[1] It is possible that in ordinary pharmaco-dynamic treatment feeble patients are better able to undergo courses of drugs, such as mercury, large doses of iodides, and thyroid preparations (which make demands on the patient's strength) in warm weather than in cold weather, when more of their energy is used up in heat-production.

bad, and Kissingen. Instead of going immediately to their homes and beginning their usual mode of life again, patients should abstain from active work and keep to a simple diet and open-air life for some weeks. They may go to some pretty part of the country not far removed from the spa, or to some not very distant mountain health resort. For some time subsequent to courses of active laxative waters, the nervous system and bodily functions are in a specially sensitive condition, and are easily thrown out of order (as they are during convalescence from an infectious disease) by nervous excitement, business worry, or bodily fatigue.

During the 'cure' the patient gets rid of the unhealthy and effete material accumulated in his tissues. During the 'after-cure' a vigorous building-up process ought to take place, just as it does during convalescence from a disease, and new healthy material is assimilated by the tissues in place of the unhealthy material cast off during the 'cure.' Roughly speaking, something of this sort is what takes place, and neglect of the 'after-cure' may lead to disagreeable consequences, another breakdown, and the patient may lose all the good results of the treatment. In many cases of overwork, with or without actual 'breakdown,' the three weeks or so occupied by the spa-treatment, even if we were to regard them as a period of rest (or change of occupation) for the mind, would not be as long a holiday as the condition of the patient's nervous system requires. In such cases an after-cure has to be prescribed, for the simple reason that the patient must be kept away from his work for a longer period than that of the spa-treatment. At some spas the importance of the 'after-cure' seems still to be hardly sufficiently recognised.

In Chapter XXI. we shall give a short summary of suitable localities for the 'after-cure' in different classes of patients.

CHAPTER VI

SIMPLE OR INDIFFERENT THERMAL WATERS

These waters taken internally (see pp. 3 and 32) help in the removal of waste products from the tissues, and hence are useful in some cases of chronic gout and rheumatism, and in preventing affections connected with auto-intoxication, especially in those cases where more active waters are not advisable. By increasing the secretions and rendering the contents of the bowels more fluid, they may be of service in cases of constipation due to insufficient intestinal and biliary secretion. By their soothing local action, and by their indirect influence on the general nutrition, they may have a good effect in some forms of gastralgia and irritable conditions of the gastric and intestinal mucous membranes.

In the form of warm baths they exercise a sedative influence on the nervous system. Hence they may be useful in some cases of neuralgia, in hyperæsthesia, painful menstruation, nervous cough, and tendency to hysteria and functional nervous affections, especially in individuals of the erethic class.

Many of the warm baths of this group have been employed for the chronic results of localised peritonitis, and particularly for the remnants of inflammation in the pelvic organs (chronic perimetritis, parametritis, peri-parametritis). At Plombières the baths have been made use of for treating the chronic troubles left after typhlitis and perityphlitis (appendicitis).

As baths, these waters have also enjoyed a great reputation in the treatment of painful cicatrices (especially

the hotter baths), and in the healing of troublesome wounds and ulcers.[1] In the latter class of cases they act doubtless, partly by improving the general health of the body, partly by a local action, similar to that of the prolonged local and general baths employed by surgeons in phlegmons, burns, &c. They clear away discharges from the surface of the wound, maintain an even temperature, promote and equalise the circulation in the skin, and exercise a soothing effect on the exposed nerve-endings. In these days of antiseptic and aseptic surgery this class of spa-treatment will probably be less required.

The action of prolonged tepid baths as employed at Loèche-les-Bains in chronic cutaneous eruptions is probably somewhat similar. The tepid water macerates the epidermic scales of psoriasis, and washes away the scales and exudation of eczema; a soothing yet tonic effect on the nerve-endings is exercised by the continued application of the thermal water at a constant temperature, and the circulation in the small blood-vessels of the skin is, at the same time, doubtless improved and equalised. Some of the successful cases of former days may have been in persons afflicted with scabies, before the 'acarus scabiei' or 'sarcoptes hominis' had been discovered as the cause of the affection. In such cases the parasites may simply have been drowned in the long-continued baths. By their probably slight antiseptic action (see the commencement of Chapter XIV.) sulphur waters may have been still more successful than indifferent waters in the treatment of wounds and certain skin affections.

It seems difficult to understand how any permanent

[1] Thus Paracelsus, in his account of Pfaeffers (a genuine work of his), speaks of the curative action of these waters in cases of ulcers, sinuses, and incompletely healed wounds. In the Apothecaries' Hall of London is a painting of the baths of Pfaeffers, and it may be presumed that Franc. Manning, British Minister to Graubünden, whose attempted assassination, June 27, 1711, is recorded on the picture, considered that he owed a debt to these waters.

benefit can be derived from warm baths in organic affections of the nervous system; nevertheless, some indifferent thermal springs, such as those of Wildbad and Gastein, have obtained a reputation in the treatment of chronic spinal affections. It is certainly unlikely that warm baths judiciously used can do harm in commencing cases, and by improving the general nutrition they may do at least temporary good in chronic affections of the spinal cord, they may relieve the pains of tabes dorsalis, and possibly at times arrest the progress of a chronic case; the possibility, however, of a spontaneous arrest must always be kept in mind. It is probable that in former times thermal baths sometimes got the credit of curing cases of paralysis which were really of functional nature, and cases of paraplegia and apparent tabes when these were really due to peripheral neuritis,[1] and in the ordinary course of events would have tended to recovery.

Much is now known of the ætiology of peripheral neuritis, and most cases can be traced to alcoholic drinks, lead, arsenic, and the toxines circulating in the blood after diphtheria, enteric fever, and other infectious diseases; but in other cases the cause cannot exactly be ascertained, and they are spoken of as rheumatic, idiopathic, &c. Some of the more chronic forms of neuritis, evidenced by pain, anæsthesia, paræsthesia, or even by loss of motor power in nerve areas, may possibly be caused by a vitiated condition of the blood, due to some one of the various possible kinds of auto-intoxication, and may be associated with a cachectic condition of the whole

[1] Some cases of peripheral neuritis, the so-called 'pseudo-tabetic' cases, in their symptoms bear considerable resemblance to locomotor ataxy. It is possible that the recovery of this form of cases under simple thermal treatment may have helped in giving some spas a reputation of being able to cure incipient cases of tabes dorsalis. Moreover, some of the sensory symptoms of tabes itself are probably often due to changes in the nerves or nerve-roots, rather than in the spinal column, and these symptoms (notably the 'lightning pains') may occasionally be temporarily relieved by warm baths, as wel as by other measures.

body. In such cases especially are thermal baths likely to do good by exerting a favourable influence on the general nutrition and on the excretions.

It has been suggested by H. Scoutetten,[1] and many others, that the therapeutic effects of simple thermal and other baths might be in great measure due to electrical action between the body and the water of the bath. It is not, however, probable that any electrical currents, which may be set up between the body and the surrounding thermal water, exercise any therapeutic action whatever. The electrical theory is, in fact, as unsatisfactory as is the suggestion that these waters owe their power to the nitrogen or the alkaline silicates which they contain.

Other mineral waters are more frequently employed internally for gout, but in many delicate gouty persons no mineral waters need be drunk, the treatment being limited to tepid baths aided by climate and diet.

In chronic rheumatism, painful rheumatoid arthritis, sciatica and neuralgias the hotter baths are more useful than the tepid ones. In chronic cases of muscular rheumatism, sciatica, and in stiff joints from gout, chronic rheumatism or rheumatoid arthritis, douches, massage, and Swedish gymnastics form often the most important part of the treatment, altogether superseding, in some cases, the simple hot baths.

In selecting a spa of this group much must depend on the ability in the local medical guidance and on the skill of the persons applying the douches, massage, and Swedish gymnastics. In other cases the accommodation, accessibility, situation, climate, and elevation above the sea-level, must be considered in addition to the temperature of the waters. In the following pages the situation, altitude, temperature of the waters, &c. of most spas belonging to this group will be found.

Wildbad and Ragatz-Pfaefers have been placed first to serve as types, and the rest of the spas have been

[1] H. Scoutetten, *De l'Electricité considérée comme Cause Principale de l'Action des Eaux Minérales sur l'Organisme*, Paris, 1864.

arranged in the political geographical order mentioned in the Preface, viz.:—Great Britain, Belgium, German and Austrian Empires, Switzerland, France, Italy, Spain and Portugal. Bath, Buxton, Wildbad-Gastein, Schlangenbad, and Plombières might equally well have been given as types of this class of spas.

Wildbad (Würtemberg) lies at an altitude of 1,410 feet in the deep valley of the Enz, a typical valley of the Black Forest, with lofty, rather steep, pine-clad slopes on both sides, up which long zigzag walks may be taken. The main direction of the valley is from north upwards to the south; the climate is fairly bracing, and even in hot weather the nights are rather cool.

Wildbad, in spite of the great number of visitors who resort to it during the season, has not become too large, and has fairly well preserved its reputation as the type of 'Wildbäder,' or indifferent thermal baths. The temperature of the springs varies from 91·5° to 104·5° F. The Eberhards-Brunnen and the Königs-Brunnen are the most used for drinking, but there is naturally little difference between the different springs. Karlsbad or similar salts are added when a laxative effect is required, and, when desirable, the waters of other spas are drunk at Wildbad.

The chief reputation of Wildbad depends on its baths. There are two excellent bath-houses, the Great Bath-house and König Karls Bad, which both belong to the Würtemberg Government. The kind of bath chiefly used is the 'Wild-Bad,' an ordinary thermal bath in which the water bubbles up from a sandy floor, and is kept continually running off by the overflow pipe, so as to imitate a bath at an idyllic thermal fountain. There are likewise ordinary thermal baths, cold water baths (for which the cooled thermal water is used), hot air and vapour baths, electric baths, douches, and a set of Dr. Zander's medico-mechanical appliances for 'Swedish gymnastics.' Poor patients can have cheaper baths in the Katharinen-Stift. In the bath the surface of the body becomes covered with small bubbles, probably of

nitrogen, but this phenomenon is not supposed to have any therapeutic significance.

The indications for Wildbad are those of thermal indifferent springs in general, namely, rheumatoid arthritis and gouty affections in feeble subjects, stiff joints from these affections or from the results of injury, convalescence from acute and chronic diseases, irritable functional nervous affections, nervous dyspepsia, some gynæcological affections and chronic skin eruptions. Cases of commencing chronic organic nervous affections, amongst which may be classed paralysis agitans, though its anatomical pathology is not yet known, likewise resort to Wildbad, as to other mild thermal waters, and are said sometimes to derive temporary benefit from their visit. In those exhausted from overwork or town life the bracing fresh mountain air and the necessary alteration in their mode of life doubtless play a chief part in the results obtained. For those who cannot, or care not to, walk uphill there are walks along the valley in both directions. The season lasts from May 1 to the end of September.

Access: Railway in about 24 hours, *viâ* Cologne, Carlsruhe, Pforzheim; or Brussels, Metz, Strassburg; or Paris, Strassburg.

Accommodation: Good.

Doctors: Weizsaecker, Haussmann, De Ponte, Josenhans, and Teufel.

Ragatz-Pfaefers (Switzerland, Canton Saint-Gall). The baths of Ragatz and Pfaefers in Canton St. Gall are both supplied by the thermal waters of Pfaefers, the first medical account of which was written in 1535 by the famous Swiss physician, Paracelsus, and dedicated by him to Johann Russinger, the liberal-minded Abbot of Pfaefers.

Ragatz, at an altitude of about 1,700 feet, is a station on the railway from Sargans to Chur. It is situated on the south-western side of the valley on both banks of the Tamina, where this stream issues from a narrow

defile to join the Rhine. The surroundings are very beautiful, and give scope for a variety of excursions. A funicular railway from Ragatz takes one up to the ruins of Wartenstein (with hotel accommodation), about 1,000 feet above the town, overlooking the valley.

A walk of about three miles (in a south-westerly direction) up the romantic Tamina Gorge brings one to the thermal spring and bath-house of Pfaefers, which has an elevation of about 400 feet above Ragatz.

The waters of Pfaefers are indifferent thermal, and it may be mentioned that they, like the waters of Wildbad, are especially rich in nitrogen gas. Their temperature at the source is 98·6° F.; in the bath-house of Pfaefers, 93·5° F.; and in the wooden pipes by which the water is conducted to the baths of Ragatz, the temperature falls to 89°–93° F.

The patients who make use of the baths at Pfaefers lodge in the bath-house. The present building, which was commenced by the monks of Pfaefers in 1704, is naturally somewhat old-fashioned, and its position in the deep gorge is rather too confined and sunless. It is used chiefly by Swiss families, most persons preferring to live and take their baths at the modern spa of Ragatz. In Ragatz there are four excellently arranged bath-houses for the ordinary thermal baths, and a swimming bath supplied with thermal water. There are likewise arrangements for douches and electric baths, and complete apparatus for hydrotherapeutic treatment. An institution fitted out with Dr. Zander's medico-mechanical appliances for 'Swedish gymnastics' is of use in suitable cases.

As at other 'Wildbäder,' the waters in many cases are used for drinking as well as for baths. In former times patients used to remain for many hours at a time in the bath, and even had their meals brought to them there; but the average duration of a bath is now about half-an-hour; and in the same way, although very large doses of

the water were formerly used internally, now only three to six glasses daily are recommended.

The indications for Ragatz are of course much the same as for other spas similar in climatic situation and in the nature of their waters. One may mention rheumatoid arthritis, chronic rheumatism, sciatica, the uric acid diathesis, many digestive and functional nervous disorders in the delicate and more irritable classes of patients. In chronic non-tuberculous articular affections, in sciatica and neuralgias, the judicious use of massage and Swedish gymnastics is often added. Like most thermal baths, these baths are employed in various chronic 'gynæcological' affections and in chronic cutaneous eruptions. In cases of slow convalescence from acute diseases, the climate, the music, and the cheerful spa life are of great assistance. Early chronic cases of various organic diseases of the nervous system are said often to derive at least temporary benefit from treatment at Ragatz.

The season at Ragatz lasts from the beginning of May to the end of October; that of Bad-Pfaefers from June to the middle of September. The best time for Ragatz is from the middle of May to the end of June, and from the second week in August to the second week in September.

Access: *Viâ* Bâle and Sargans, in about 25 hours.

Accommodation: Excellent.

Doctors: Jaeger, Bally, Dormann, Jaeger junior, Norström (massage), and (in Bad-Pfaefers) Kündig.

Bath (England, Somersetshire). — The waters of Bath (altitude 100 feet), the 'Aquæ Solis,' or 'Aquæ Sulis,' of the Romans, are the only really hot natural waters of Great Britain. Their temperature is 104° to 120° F., and, according to Attfield's analysis, they contain 1·3 per mille sulphate of calcium, ·3 per mille of sulphate of sodium, ·2 per mille each of chloride of magnesium and common salt, and about ·1 per mille of carbonate of calcium and sulphate of potassium. The

Bath waters are best classed in the indifferent thermal group. Very extensive remains of the Roman thermæ exist, and to the credit of the authorities, are carefully preserved. They are connected with the modern thermal establishment, which was extended in 1897. The city is beautifully situated, and owing to the surrounding hills the climate is mild and equable, so that the waters can be used all the year round. Spring and autumn are, however, the favourite seasons for a 'cure.'

Owing to a variety of causes, and partly merely to 'change of fashion,' Bath has lost much of the fame which it acquired in the eighteenth century: a fame in great part due to Beau Nash, and the fashionable guests whom the amusements, organised by him, attracted. Recently, however, all kinds of hydrotherapeutic appliances, and treatment by douches and massage, have been introduced, similar to those employed at foreign spas. Such methods are essential to the efficiency of a simple thermal spa, and will probably increase the number of visitors to Bath.

The 'Aix douche-massage' is given by specially trained attendants after the manner of Aix-les-Bains. The 'Nauheim treatment' [1] for cardiac affections has likewise been introduced at Bath (see under NAUHEIM). There are inhalation and spray rooms for affections of the pharynx and respiratory organs.

The waters are used internally as well as externally, their internal action being, doubtless, similar to that of the simple thermal waters generally. It is not likely that the minute quantities of iron and arsenic contained in the water exert any therapeutical action, and still less likely that the nitrogen, or recently discovered argon [2] and helium in the water exert any special effect, the anæsthetic effects caused by the inhalation of nitrogen

[1] See H. W. Freeman, on *The New Methods of Cure at Bath* (1897); also J. G. D. Kerr's *Popular Guide to the Use of the Bath Waters* (eleventh edition, 1898).

[2] Argon is chemically inert, and nearly all that is taken into the body can be found again in the expired air.

appearing to be due rather to the diminution of oxygen than to any action of the nitrogen itself. Still, in spite of theoretical grounds, it is not quite impossible that the nitrogen, argon, and helium present in certain springs (as at Bath and Cauterets) may exert a special effect in some cases, though there is no conclusive evidence that they do.

The hot baths and the 'Berthollet' natural local vapour baths are useful in chronic gout, rheumatoid arthritis and some cases of sciatica and neuralgic and muscular pains. When the patient's joints are stiff, he can be lowered into a bath on a crane-chair. In psoriasis and chronic cutaneous affections the baths may exert a good effect on the skin.

In the results of lead poisoning, in functional nervous troubles, in painful menstruation, thermal and hydrotherapeutic measures may be employed. It is hardly likely, however, that any benefit which chlorotic girls obtain at Bath is due to the small amount of iron and arsenic in the waters.

There is a 'Mineral Water Hospital' at Bath to enable poor persons to undergo the spa treatment. A military sanatorium for rheumatic and gouty complaints, or for the effects of wounds and accidents, might be erected here, as at Teplitz in Bohemia, Barèges, and Bourbonne in France, &c. Bath, owing to its position, has the great advantage of being open for invalids all the year round.

The table water sold in bottles as 'Sulis Water' is the natural Bath water artificially aërated with carbonic acid gas.

Access: From Paddington Station in 2 to 3 hours.

Accommodation: Good, though it might be improved.

Doctors: G. A. Bannatyne, S. P. Budd, W. Carter, C. Coates, W. McD. Ellis, A. E. W. Fox, T. B. Goss, F. K. Green, J. G. D. Kerr, and others.

Buxton (England, Derbyshire).—The waters of Buxton (temperature 82° F.) must be classed with those of Bath; but they are not so hot, and the climate of Buxton

(altitude 1,000 feet) is more bracing than that of Bath. The situation of Buxton, and its position in the beautiful and interesting Derbyshire Peak District, attract a crowd of visitors as well as invalids to the spa. It was several times visited by Mary Queen of Scots.

The Buxton waters are still more weakly mineralised than the Bath waters, and contain, according to Dr. Thresh, only ·2 per mille of bicarbonate of calcium, and about ·1 per mille of bicarbonate of magnesium. Besides the simple thermal waters, there are very weak non-gaseous chalybeate waters (according to Lord Playfair containing about ·015 per mille carbonate of iron), and both are employed internally, the thermal waters in doses from four ounces to half a pint.

The baths are given at the natural tepid temperature of the water for four to seven minutes; or, in the case of weaker persons, in whom the power of reaction is unsatisfactory, they may be given artificially heated to a temperature of 86°–100° F. The duration of the hot baths usually is from three to fifteen minutes. After the tepid baths, a walk to favour the reaction is advised if possible. It is unlikely that the nitrogen in the waters of Buxton can exert any special therapeutic effect.

Buxton is supplied with douches, crane-chairs for lowering cripples into their bath, and with various hydrotherapeutic appliances. Temporary slight disagreeable effects are sometimes observed during a course of the waters here as at other spas. The treatment can of course be varied considerably to suit individual cases, and should always be carried out under the guidance of a medical man.

Chronic gouty and rheumatic affections, rheumatoid arthritis, and the stiffness in the joints resulting from them, are especially treated at Buxton. Massage is combined with the thermal treatment in suitable cases. In the various conditions of weakness, produced by prolonged attacks of gout and rheumatism, Buxton is often eminently useful, partly, no doubt, through the influence

of its bracing climate. Other conditions, yielding to simple thermal waters and hydrotherapeutic processes, may likewise be benefited here. The 'Nauheim treatment' of heart affections has recently been introduced.

The season is from April to September. Buxton is open all the year round, but weather seldom permits invalids to take a course of the waters during the colder months. There is a hospital at Buxton for the spa-treatment of the poorer classes.

Access: In $4\frac{1}{4}$ hours from London (St. Pancras Station).

Accommodation: Good.

Doctors: Gifford Bennet, Arthur Shipton, Lorimer, Armstrong, Turner, &c.

Matlock Bath (England, Derbyshire).—Matlock Bath (temperature of the water 68° F.) is situated in a beautiful valley in Derbyshire on the left bank of the stream, but too much in a hollow for the climate to be bracing. The waters, which, according to Dr. Dupré, contain about ·2 per mille carbonate of calcium and ·1 per mille sulphate of magnesium, are chiefly used for bathing. Some hydrotherapeutic establishments in the neighbourhood, such as the one founded by Smedley (altitude 450 feet), are in higher, more open and more bracing positions than Matlock Bath itself (altitude about 300 feet). Lumbago, sciatica, gouty and rheumatic joint affections can be treated. Pleasant excursions may be made to various localities of the Peak District, and in Matlock itself and its immediate neighbourhood the 'petrifying wells' and the various 'caverns' are objects of interest.

Access: From St. Pancras Station (London) in about 4 hours.

Accommodation: Good.

Doctors: Holland, Moxon, Innes, Topham, &c.

Bakewell (altitude, about 400 feet), likewise in the Peak district, has similar waters (temperature 60° F.) and an old stone plunge bath, said to be Roman. The

name Bakewell (Badequelle of Domesday Book) is derived from its spring. The neighbouring Stoney Middleton has also similar waters.

The 'Hot-well' spring (only 73° F.) of Clifton (Gloucestershire), over which a building called 'Hot-well House' used to stand, was formerly famous, but is little known at present. It rises at the base of St. Vincent's rock, close to the River Avon. Clifton, with Clifton and Durdham Downs (altitude 230 feet to 310 feet), constitute a favourite climatic resort.

Mallow (Ireland, County Cork), a station on the railway from Dublin to Cork, possesses the only thermal (sub-thermal) spring in Ireland. The water has a temperature of 70° to 72° F., and must be classed in the indifferent group, being nearly pure. It was formerly much frequented by invalids.

Chaudfontaine (Belgium, Department of Liège), with a railway station 4½ miles from Liège, on the line to Aix-la-Chapelle, is beautifully situated in the valley of the Vesdre, and possesses simple thermal waters (temperature 96° F.), known as early as the thirteenth century.

Schlangenbad (Germany, Prussian Province of Nassau).—This spa lies at an altitude of about 900 feet in a deep valley leading in a northerly direction from the Rhine, which is about five miles distant. Its situation, just at the bifurcation of the valley towards the north, renders the climate mild, though the air is sufficiently well ventilated. It is connected with Eltville on the Rhine by a steam-tram, and good carriage roads lead to Langenschwalbach and Wiesbaden.

The woodland and mountain scenery of the neighbourhood is unsurpassed, and miles of shady walks lead in every direction through the forest immediately surrounding the spa. A great variety of excursions may be made to spots in the Taunus Mountains and on the Rhine.

The water is indifferent thermal, exceedingly soft, rich (like rain water or dew) in oxygen and nitrogen,

and in the white glazed baths has a beautiful bluish tint. According to Fresenius (1878), the thermal water has a total solids of only ·4 per mille, with 10 volumes per mille of nitrogen, and 3 of carbonic acid gas. There are nine different springs, the temperature of which varies from 81·5° to 89° F. Everything that can be expected from simple thermal waters and rest in pure fresh air, amidst delightful scenery, can doubtless be obtained at Schlangenbad.

The guests include persons requiring rest after overwork or work in unhealthy surroundings, convalescents, and patients suffering from simple dyspeptic troubles, neurasthenia and functional nervous troubles, and women suffering from those chronic gynæcological troubles which are likely to be benefited by simple thermal waters. The waters have a special reputation in chronic skin eruptions, roughness of the skin, and slight degrees of ichthyosis. Massage is to be obtained in suitable cases. Whey from cow's milk or goat's milk is employed in some digestive affections, and the chalybeate waters of the neighbouring Schwalbach are brought here for anæmic patients.

For the most robust types of cases spas possessing more active waters are usually more suitable than Schlangenbad. The place is, however, sometimes used for an 'after-cure' by patients coming from Karlsbad, Marienbad, Kissingen, Ems, &c. There is, perhaps, no other spa which exercises so soothing an influence on the nervous system.

Access: Railway *viâ* Cologne to Eltville; thence about 5 miles by steam-tram.

Accommodation: Very good. Rooms may be had in the thermal establishment itself.

Doctors: Baumann, Wolf, &c.

Badenweiler (Grand-Duchy of Baden) is beautifully situated at an altitude of 1,370 to 1,470 feet in the southern portion of the Black Forest, near the Swiss frontier. The town is sheltered on the north, east,

and south by a semi-circle of pine-clad mountains. West winds predominate, and the equable mild temperature renders the place a climatic health resort for delicate patients and those suffering from pulmonary affections. When more bracing air is required patients can reside at the more elevated 'Haus Baden' (1,750 feet). Walks on the surrounding slopes have been arranged for a 'Terrain-Cur.'

The temperature of the indifferent thermal springs of Badenweiler is 79° F., and according to Bunsen the water has a total solids of only ·35 per mille; it is used more for bathing than internally. Besides the beautiful 'marble bath' there is another large bath open to the air, and smaller baths for separate patients may likewise be obtained. Neighbouring remains of the ancient 'thermæ' show that the waters were used in Roman times.

The tepid baths of Badenweiler, aided by the climate, are used for much the same class of patients as are other 'Wildbäder.' Amongst the patients are convalescents, overworked delicate persons, chronic rheumatic and gouty cases, cases of chronic neuralgia, neurasthenics, and 'irritable nervous' persons. The baths are usually employed in cases where much excitation is undesirable, but sometimes it is convenient to artificially heat the water or to render the baths more excitant by the addition of common salt, a 'Mutterlauge' obtained from some 'Soolbad,' or otherwise medicate them. The season lasts from May 1 to October 1.

Badenweiler is much more used as a climatic health resort and for rest after active courses of mineral waters than for bathing purposes.

Access: In about 21 hours from London.

Accommodation: Very good, in hotels and private villas.

Doctors: F. Neumann, H. J. Thomas, W. Kollmann, and A. Fränkel.

Liebenzell, about eight miles from Wildbad, is

beautifully situated (altitude 1,100 feet) in a Würtemberg Black Forest Valley, and has thermal springs similar to those of Wildbad, but the temperature is lower (72° to 82° F.), so that the baths have often to be artificially heated. This spa enjoys a special reputation in the treatment of gynæcological affections. It is five miles from the railway station of Pforzheim.

The accommodation is more homely than at Wildbad, and the place is not much resorted to by English invalids or visitors.

Landeck (Prussian Silesia) possesses indifferent thermal springs, having a temperature of 66° to 84·2° F. The waters contain minute quantities of sulphide of sodium and sulphuretted hydrogen, and were, therefore, formerly classed in the sulphur group. The place lies at an elevation of 1,470 feet in the mountainous country of Glatz, eighteen miles distant from the railway station of Glatz. Landeck has been termed a 'German Saint-Sauveur,' and is chiefly visited by ladies for chronic rheumatic, pelvic and functional nervous affections.

Warmbrunn (Prussian Silesia) is a summer resort in the Hirschberg Valley, situated on the northern declivity of the Riesengebirge, 1,090 feet above the sea. It possesses indifferent thermal springs, having temperatures of 77° to 109° F., which were classed formerly as sulphur springs, because three of the five smell slightly of sulphuretted hydrogen. There is likewise a chalybeate spring, the 'Victoria-quelle.' The railway stations of Hirschberg and Reibnitz are about four miles distant.

Gastein (Wildbad-Gastein) in Austria (Duchy of Salzburg).—The place (altitude 3,310 feet) where the thermal springs arise is called Wildbad-Gastein (or Bad-Gastein) to distinguish it from Hof-Gastein (altitude 2,755 feet), which lies about five miles to the north, and is supplied through wooden pipes by the same waters. The Gastein Valley has a direction almost exactly southwards from Lend, and Wildbad-Gastein lies on the

mountain slopes at the southern end of the valley, about 15 miles from Lend, over the Falls of the Gasteiner Ache, which send up clouds of spray into the air. The position is almost completely sheltered from winds, the promenades are pleasant, and the surrounding mountain scenery is most imposing. Hof-Gastein lies in a broader part of the valley, nearer to Lend.

The numerous thermal springs (total solids 0·3 per mille, according to Redtenbacher) have temperatures ranging from 78·5° to 121° F.; and although peculiar electrical conditions are claimed for the waters, their action is probably merely that of indifferent thermal waters in general, aided by the mountainous climate.

The waters are chiefly used for baths, and enjoy an old reputation in the treatment of nervous affections of various kinds, as well conditions of merely functional origin as chronic affections due to organic changes in the nervous system, such as tabes dorsalis. In true cases of the latter class only a limited amount of benefit can of course be anticipated. The hotter baths are used for neuralgias. In gout, rheumatism, chronic metritis, and the remains of inflammation in the female pelvic organs, they are of service like other 'Wild-bäder.'

The climate is sometimes of special service in the treatment of convalescents and in patients coming for an 'after-cure' after treatment at Karlsbad, Marienbad, &c.

In some gouty cases, cases of nervous dyspepsia, &c., the waters are used likewise internally. Dietetic management is facilitated by the restaurant arrangements, which much resemble those of the hotels at Karlsbad.

The season lasts from May 1 to the end of September, but the months of July and August form the main season; and, though the accommodation is good, during these months the place is so crowded with visitors that it is impossible to get rooms unless ordered some weeks

in advance. The hotels and lodging-houses of Bad-Gastein and Hof-Gastein have baths of their own directly supplied with thermal water. Excitable persons who cannot bear noise ought to stay at some distance from the waterfall.

Access: *Viâ* Zurich and Innsbruck, or Munich and Salzburg to Lend; thence by carriage past Hof-Gastein (about 3 hours) to Bad-Gastein in about 4 hours.

Doctors: Schider, Wassing, Gager, &c.

Voeslau, in Lower Austria (altitude 810 feet), is situated in a pretty country, on the railway about 30 miles south of Vienna. It possesses indifferent waters (temperature 75·2° F.) only used for bathing, and chiefly by ladies for functional nervous troubles, &c. It is one of the localities for the 'grape-cure.'

Teplitz (Teplitz-Schönau) in Bohemia.—This spa, which, since its recent union with the neighbouring village of Schönau, has been called Teplitz-Schönau, is the oldest spa in Bohemia. It lies in a broad open valley at an altitude of about 730 feet, and is sheltered on the north by the Erzgebirge, and on the south by the Mittelgebirge, of which the Königshöhe (870 feet), immediately overlooking the town, is a projecting spur.

The town possesses a considerable commercial importance, which tends somewhat to modify its character as a spa.

The weakly alkaline waters (·4 sodium carbonate, Liebreich in 1897 found the total solids ·7 per mille) may be classed amongst the simple thermal group (temperature 83° to 114° F.). In February, 1879, the supply at Teplitz was suddenly interfered with owing to the accidental tapping of a communicating spring in working a coalpit near Dux. It seemed at first as if the underground stream had been diverted from Teplitz, but, on a new boring being made in the town, the supply of water was re-established, and is now as plentiful as can be desired, though it has to be pumped up.

There are many different bath-houses in Teplitz, the

most luxurious of which is the Kaiserbad belonging to the town; in nearly all of these bath-houses patients can likewise be lodged. Besides the ordinary thermal baths there are baths of peat ('moor-baths'), the peat being obtained for this purpose from the neighbourhood. The Teplitz peat contains much less iron, and is said to be less stimulating than that of Franzensbad and Karlsbad, which two latter both derive their peat from the Franzensbad moor. The Teplitz 'moor-bath' is given at a higher temperature (about 99·5° F.) than those of Franzensbad and Karlsbad (about 89·5° to 95° F.), and a greater anodyne effect is claimed. Massage may be obtained in suitable cases.

The patients who visit Teplitz are mostly sufferers from chronic rheumatic and gouty affections, sciatica, lumbago, neuralgias, or functional nervous affections. Temporary improvement is said to follow the treatment in some cases of commencing tabes. The baths are likewise used in chronic cutaneous eruptions, and in wounds and ulcers slow to heal. There are Austrian, Saxon, and Prussian military sanatoria at Teplitz.

The waters of Teplitz are, like those of other simple thermal spas, used more for baths than for drinking courses. The mineral waters of Karlsbad or Marienbad, to be obtained in the Kurgarten, may be employed in some cases, or those of the neighbouring alkaline springs of Bilin, or the bitter waters of Püllna, Sedlitz, and Saidschitz, near Teplitz. A stay at Teplitz is sometimes recommended as an 'after-cure' after treatment at Karlsbad, Marienbad, Franzensbad, &c.; but Teplitz was probably formerly more used for this purpose than it has been recently, patients being now more often sent to the Alpine health resorts.

The season at Teplitz lasts from May to the end of September, but patients are received throughout the year.

Access: In two days, *viâ* Dresden.

Accommodation: Good.

Doctors: Hirsch, Eichler, Müller, &c.

Johannisbad (Bohemia) lies at an altitude of about 2,300 feet in a mountainous region to the south of the Riesengebirge. Its waters belong to the indifferent thermal class, and have a temperature of 85° F. The effect produced in cases of prolonged convalescence, general weakness, and functional nervous disorders, is partly owing to the exhilarating nature of the climate. There is a weak chalybeate spring in the neighbourhood, containing, according to Schierholz (1895), ·01 per mille bicarbonate of iron. Sometimes patients rest for a few weeks at Johannisbad after treatment at Karlsbad, Marienbad, &c. The season is from May 15 to the end of September. According to Knaur, the pleasantest time for a visit is during the end of August and September, when the weather is usually settled and the air especially clear.

Access: Johannisbad is 1½ miles from Freiheit, the terminus of a branch railway from Trautenau.

Accommodation: Satisfactory.

Doctors: Schreier, Knaur, &c.

Römerbad and **Tüffer** (Styria, Austrian Empire), both stations on the railway from Graz to Trieste, lie near to each other at an altitude of about 820 feet, and possess indifferent thermal waters (temperature 95° to 102° F.). Römerbad, like Schlangenbad, has a name for hysteria and chronic diseases of the uterus.

Tobelbad, an ancient spa in Styria (also called Dobbelbad), lies at an altitude of 1,090 feet. Its two indifferent thermal springs have temperatures of 77° and 83·5° F. The railway station is 25 minutes distant.

Neuhaus, in Styria, formerly called Töplitz bei Neuhaus (altitude 1,200 feet), is pleasantly situated a few miles from Tüffer and the railway station of Cilli. Its indifferent thermal waters have a temperature of 98° F. There is likewise a chalybeate spring.

Buda, or **Ofen,** forming with Pest, on the opposite side of the Danube, the city of **Buda-Pest,** capital of

Hungary, possesses indifferent thermal and thermal sulphur waters, with commodious thermal establishments. The Margarethenbad on the Margarethen-Insel in the Danube must specially be mentioned on account of the excellence of its arrangements. The city is, however, still better known for the springs of cold 'bitter water' in its neighbourhood, some of which, such as the Hunyadi Janos, Franz-Joseph and Apenta waters, are largely exported.

Amongst waters of the German and Austrian Empires which belong to the indifferent thermal group the following may also be mentioned:

Wiesenbad and Wolkenstein (Warmbad near Wolkenstein), in the kingdom of Saxony, Sulzbach, in the Baden Black Forest, Villach, in Carinthia, with altitudes of between 1,000 and 1,600 feet; and Brennerbad (altitude 4,360 feet), in Tyrol, at the top of the Brenner Pass; these all possess waters having the relatively low temperatures of 70°–85° F.

Veldes (Upper Carniola) is beautifully situated at an altitude of 1,560 feet on the Lake of Veldes, in the Savethal. It possesses an indifferent spring of 80° F., but is better known as a summer resort, where treatment by sun baths and hydrotherapeutics can be obtained. The railway station (Lees-Veldes) is $\frac{3}{4}$ hour distant.

Rajeczfürdö, formerly called Rajecz-Teplicz, situated in Upper Hungary, 1,374 feet above sea level, one hour from the railway station of Sillein, possesses thermal waters (temperature 91·5° F.) which contain minute quantities of iron and alum, but may be ranked in the indifferent thermal group.

Warmer than these waters are those of Krapina Töplitz (altitude 530 feet, and temperature of waters 99·5° to 110° F.), and Topusko (temperature of waters 122° to 135° F.), both in Croatia, and of Daruvar, in Slavonia (temperature of waters 104° to 117° F.).

Loèche-les-Bains (Louèche-les-Bains or Leukerbad), in Switzerland (Canton of Valais).—This spa has an

altitude of about 4,600 feet, and is situated at the southern commencement of the Gemmi Pass, about three and a half hours' drive from Louèche-Souste, a railway station on the line from Lausanne to Viège.

The climate is that of high Alpine valleys, fairly well sheltered from cold winds. It may be hot in the middle of the day during the season, but the sun rises late and sets early, owing to the mountain heights around the spa. The warming of the rocky cliffs assures sufficient ventilation of the air, even in the absence of regular winds. During June to September the mean temperature at 1 P.M. is calculated by Dr. de Werra as about 60° F., whilst the mean temperatures at 7 A.M. and 9 P.M. are about 50° F. The average relative humidity during the same months is about 68 per cent. of saturation.

The waters have been classed in the simple thermal group,[1] though, according to Professor Lunge (1885), they have a mineralisation of 1·9 solid parts per mille (1·4 sulphate of calcium), and, like the waters of Bath and Bormio, may equally well be placed in the earthy group. The temperature of the springs is from 102° to 124° F., the Saint-Laurent spring being the warmest. There are about twenty different springs, but only a few are made use of.

The climate is doubtless of great assistance to the balneo-therapeutic treatment, which consists chiefly in long and short baths. Hydrotherapeutic treatment and the Aix douche-massage are likewise made use of in suitable cases. The waters are sometimes employed internally in daily doses of one to five glasses, and have a diuretic effect, and a sedative action in some cases of gastric irritability.

The short baths are employed in functional nervous affections and the same class of cases as ordinary thermal baths, but the prolonged bath treatment forms a kind

[1] The predominant external use of the waters justifies their classification in this group.

of speciality of this spa. Usually the spa guests are advised not to begin the baths immediately after their arrival, but to wait a day or two; all fatigue of the journey has by that time passed off, and the patient has got accustomed to the elevation. The prolonged baths are taken at a temperature of 93° to 95° F. and last one to six hours. Ladies and gentlemen clothed in woollen garments bathe in large baths (a partition separating the sexes), where they can take light refreshments and play chess, draughts, dominoes, &c. on floating tables.

July and August are the chief months for the cure, and at that time patients begin to arrive at the baths by five o'clock in the morning, and usually take a cup of tea, coffee, or chocolate in the bath. After the bath they usually go back to bed for half-an-hour or an hour, then take a short walk, and are ready at 11 o'clock for a proper meal. At about 3 P.M. the afternoon bath commences, and is likewise often followed by a rest in bed. At six is the chief meal of the day, followed by music, &c. in the evening. The duration of the day's bathing is at first only an hour, and is gradually increased.

About the tenth or eleventh day the patients expect to see a skin eruption appear, which is called the 'poussée.' It is polymorphic, varying from a slight redness to a moist dermatitis, and may be accompanied by constitutional symptoms, loss of appetite, &c. According to the spa doctors, it lasts from ten to fourteen days, and is absent in 9 per cent. of the cases. A looseness of the bowels sometimes occurs instead of the eruption.

The prolonged baths are found useful in chronic skin affections, including eczema, psoriasis, chronic urticaria, &c. Their effect probably depends in great part on the maceration of the superficial epidermis, and on the equalisation of the circulation in the cutaneous blood-vessels by the constant temperature of the water. The elevation above sea-level, which by itself exercises an indirect influence on the skin, may aid the other treat-

ment in patients whose general condition is suitable for residence in high altitudes. Syphilis is treated by the prolonged baths in association with ordinary treatment. The prolonged baths, hot douches and douche-massage are likewise employed in many chronic rheumatic affections; in this class of cases the prolonged tepid baths take the place of the short hot baths of many other spas.

The season lasts from June to September.

Access: By railway, *viâ* Lausanne, to the station of Louèche-Souste; thence three and a half hours by carriage; or else, from Northern Switzerland, over the Gemmi Pass.

Accommodation: Now good.

Doctors: J. de Werra, A. Brunner.

Saint-Amand (France, Department Nord).—The town (altitude about 100 feet) is situated between Lille and Valenciennes, on the vast plain of that part of France. The thermal establishment is about two miles from the town on the border of a large forest, in which there are plenty of shady walks.

Its weakly mineralised waters, of which the 'Fontaine-Bouillon' was possibly known to the Romans, have, according to Willm's analysis of 1895, a total solids of 1·3 per mille (0·6 sulphate of calcium), and are best classed in the indifferent group, although there is a faint smell of sulphuretted hydrogen. The temperature is about 70°–79° F., but it is supposed that it will be higher when the springs are freshly inclosed.

The water is used for drinking at meals, &c., but Saint-Amand is chiefly known for its mud baths, for which a peculiar soil dug out from the neighbourhood of the springs is used. This soil contains some carbonate of iron and a considerable amount of sulphuretted hydrogen gas; it is prepared for use with the thermal water. The temperature at which the baths are given is about 98° F. or higher. The time for taking them is the early morning; they are heated on the preceding day.

Most of the patients take their mud baths in a large

circular building (the rotunda). The floor of this is divided into a great number of compartments, one of which is filled with mud for each person at the commencement of his treatment, so that no one need bathe in mud already used by anyone else, though a single lot of mud lasts a patient for his whole course of baths. Patients remain from one-half to five hours in the mud, but they can read and write, or converse and play cards with their neighbours, or otherwise amuse themselves. The part of the body not immersed is covered with a loose garment. For entering the bath and leaving it curtains can be let down around each compartment, and patients can bathe in private rooms if they prefer it. The baths are of course followed by a short ordinary bath or douche, which washes off the mud.

Hydrotherapeutic treatment, massage, &c. are also made use of, accordingly as the doctor thinks desirable.

The mud baths are employed in rheumatoid arthritis and chronic rheumatic affections, neuralgias, stiff joints resulting from injury, and some chronic skin affections. H. Thiroux claims for them excellent results in relieving the trophic disturbances associated with varicose veins of the lower extremities (' varicose eczema,' &c.). In some nervous affections, and notably in relieving the pains of tabes dorsalis, satisfactory results are likewise recorded.

Season : June to the end of September.

Access : The station of Saint-Amand is on the railway between Lille and Valenciennes. There is likewise a nearer station, ' Fontaine-Bouillon,' on a local line.

Accommodation : Satisfactory. Extensive additions and alterations are under consideration.

Doctor : Thiroux.

Plombières, France (Department of Vosges).—The town (altitude 1,300 feet) is built on the banks of the Augronne stream in a rather narrow valley of the Vosges Mountains. The waters belong to the simple thermal class (77° to 155° F.), but contain minute quantities of arsenic. Some of the springs impart a

peculiarly 'unctuous' sensation, due to the presence of silicate of aluminium. These are hence called 'Sources Savonneuses.'

There are several bath establishments, the best of which is the new one constructed under Napoleon III. An ancient Roman sudatorium, now connected with the Stanislas establishment, is still used as a hot vapour bath, the hot vapour for which is supplied by the natural thermal water. It is largely to Napoleon III. that the spa owes its modern improvements.

The indications are those for simple thermal treatment in general. The waters are employed to some extent for drinking and inhalation, but chiefly for sedative warm baths and douches. Massage is prescribed when necessary, and vapour baths are employed in some rheumatic cases. The inhalation rooms are on the Wassmuth system, first introduced from Germany into France at Mentone. Sometimes the weak non-gaseous chalybeate 'Source de Bourdeille' is employed internally instead of the ordinary thermal water.

Plombières has a good reputation in the treatment of gastralgia, nervous dyspepsia, chronic catarrhal enteritis, chronic diarrhœa, and functional nervous disorders, especially in arthritic subjects.

The baths have likewise been employed for the chronic remnants of localised peritonitis, and notably for the results left after perityphlitis (appendicitis).

The Plombières season lasts from the end of May to the middle of October. The mornings are mostly occupied with the thermal treatment, and the time between the midday meal (at eleven or twelve o'clock) and dinner (at six or seven) is usually free for promenades, excursions, &c. There are interesting excursions to be made in the neighbourhood. Amongst the shorter ones is the gentle up-hill walk of one and a half hours through a beautiful wood to the fountain of King Stanislas.

Access : Viâ Laon, Reims, Nancy, and Epinal; in

about nineteen hours. Plombières is the terminus of a branch railway from Aillevillers.

Accommodation: Good.

Doctors: Bottentuit, &c.

Bains-les-Bains lies at an altitude of 980 feet in a valley of the Vosges Mountains. It possesses many simple thermal springs (temperature 84° to 122° F.), similar to, but much less used than those of its neighbour Plombières. They had a reputation in hysterical complaints.

Luxeuil-les-Bains in France (Department of Haute-Saône).—The town of Luxeuil (altitude 1,300 feet) lies on fairly level ground at the western foot of the Vosges Mountains, about 12½ miles from Plombières. Roman remains exist at the former as at the latter spa.

The simple thermal springs, which contain minute amounts of common salt, iron, manganesium, and arsenic, vary in temperature from 93° to 125° F.; they are used chiefly in the form of baths and douches for the class of cases usually benefited by simple thermal methods, especially for affections of the female pelvic organs and neurasthenia. The thermal water is likewise used for vaginal and rectal douches. The 'Source du Puits Romain' and the 'Source du Temple' (temperature 82° F.) are non-gaseous chalybeates. The arrangement of the patient's day is very similar to that at Plombières and other French spas where baths form the chief part of the treatment. Season: the end of May to the end of September.

Access: Luxeuil is a railway-station between Aillevillers and Lure.

Doctors: Barbaud, Heraud, Gauthier, &c.

Aix-les-Bains, in France (Savoie).—This spa has for convenience been classed in the sulphurous group (Chapter XIV.)

Aix-en-Provence (Department of Bouches-du-Rhône), the 'Aquæ Sextiæ' of the Romans, and the ancient capital of Provence, is situated at an elevation

of 590 feet, on the railway route between Marseilles and Grenoble. Its indifferent thermal waters have a slightly variable temperature of about 91° F. (as measured at the establishment itself).

Néris, in France (Department of Allier).—Néris (altitude 1,150 feet), pleasantly situated on an elevated plateau to the south of Montluçon, was known to the Romans, as the abundant Gallo-Roman remains testify. Its alkaline waters (·45 per mille of bicarbonate of sodium, ·36 per mille of sulphate of sodium) are so feebly mineralised that they are best classed in the simple thermal group.

Néris has an excellently arranged thermal establishment for baths, douches, hot vapour baths, massage, &c. It has also a hospital for poor patients requiring thermal treatment.

The waters of the Néris wells have temperatures ranging from 102° to 126° F.; they are chiefly employed externally. A greenish spongy substance (limon) is formed in the thermal reservoirs. It is due to the growth of confervoïdeæ, and resembles the material found in the similar and neighbouring waters of Évaux-les-Bains. Like the latter, it is sometimes employed as a local application, but not so much as it was formerly. The action of the Néris baths is sedative, although some form of 'well-fever' or 'poussée' often appears, according to De Ranse, between the fifth and twelfth days of treatment. The affections treated include chronic rheumatic and gynæcological complaints, especially when occurring in nervous, excitable subjects; so also sciatica and neuralgias. Néris has a good reputation in the treatment of functional nervous disorders, including neurasthenia, hysteria, some forms of nervous 'pseudo-angina pectoris,' &c., at least in cases where a sedative effect is desired. The baths may likewise exert a palliative influence in the pains, &c., of tabes dorsalis.

Prolonged baths are sometimes employed for hysteria. The douche-massage has been introduced after the

manner of Aix-les-Bains, for the treatment of rheumatic cases, &c.

The season extends from May 15 to the end of September.

Access: By Paris and Montluçon; three miles distant from the railway station of Chamblet-Néris. It may sometimes be more convenient to take the omnibus or a carriage from Montluçon (5 miles in ¾ hour).

Accommodation: Satisfactory.

Doctors: De Ranse, Peyrot, Morice, &c.

Évaux-les-Bains (France, Department of Creuse).—The Thermal Establishment (altitude 1,500 feet) is situated in a pleasant park, close to the ancient town of Évaux, and about one mile from its railway station (on the line between Montluçon and Eygurande). It has several springs of simple thermal water (temperature 79°–134° F.), analogous to those of Néris, rich in nitrogen and organised material. This latter, consisting of confervoïdeæ, forms a thick greenish sponge-like material, which floats on the surface of the water, and is called 'limon' by the inhabitants of the country, who sometimes apply it locally to wounds and abrasions, &c. One of the springs is slightly sulphurous, perhaps due to the action of the living organisms contained in it. An ancient circular piscina and other remains show that the thermal waters were made use of in Gallo-Roman times.

The treatment (baths, douches, and hot vapour baths) is almost entirely external. The patients, who at present come chiefly from the neighbouring Departments, have the convenience of being able to lodge in the same building in which they take their baths.

Mont-Dore (France) in the Auvergne. (See Chapter XIII.)

Châteauneuf (France, Puy-de-Dôme) is described in the simple alkaline group (Chapter VIII.)

Chaudes Aigues (France, Department of Cantal).—The village is situated at an altitude of 2,050 feet, in a

narrow valley, about three hours' driving distance from the railway station of Saint-Flour. Its waters, said to be the hottest in France, are feebly alkaline (·48 per mille of carbonate of sodium), and contain minute quantities of the iodide and bromide of sodium, but are best classed amongst the indifferent thermal waters. The temperatures of the principal springs range from 135° to 180° F. The season is from June 1 to September 15, and the patients are mostly from the neighbourhood.

Sylvanès (France) in the Department of Aveyron. (See Chapter XIII.)

Sail-les-Bains, or **Sail-les-Château-Morand** (France, Department Loire), lies in a valley at an altitude of about 820 feet. Its weakly mineralised springs (temperature 79°–93° F.) may be classed in the simple thermal group. There are likewise a sulphurous and a weak, cold ferruginous spring. The nearest railway station is Saint-Martin-d'Estreaux, 3 miles to the south-west. The spa is situated in extensive grounds.

Saint-Laurent-les-Bains (France, Ardèche) is situated in a picturesque gorge, at an altitude of about 2,700 feet, six miles from the railway station of La-Bastide. Its simple thermal waters have a temperature of 128° F.

Foncaude (altitude 130 feet), in the Department of Hérault, near Montpellier, has indifferent waters (78° F.)

Avène, in the same Department (altitude 980 feet), has indifferent waters with a temperature of 81° F.

Alet (altitude 650 feet), in France (Department of Aude), has a railway station, twenty-two miles south from Carcassonne on the line to Quillan. Its weakly mineralised alkaline springs have temperatures of 64° to 102° F. The thermal establishment is open all the year.

Campagne-sur-Aude (France, Department of Aude), about one mile from the railway station, possesses feeble

mineralised, slightly ferruginous springs, which may be classed in the indifferent group (temperature 68° to 79 °F.). Campagne (altitude 820 feet) was more visited in the 16th century.

Rennes-les-Bains (France, Aude).—The first class of waters mentioned in the description of this spa (Chapter XII.) may be placed in the simple thermal group.

Dax (France, Department of Landes).—The town (altitude about 130 feet) lies on the left bank of the Adour, and is a railway station on the line from Bordeaux to Bayonne, 32 miles from the latter town. Dax was the Roman[1] 'Aquæ Augustæ Tarbellicæ,' and derived this name as well as its present name from its hot springs (Dax, De Aquis), which may be classed in the indifferent thermal group. The temperature of the Dax water is 88° to 140° F., but at the source of the famous 'Fontaine Chaude' it has been recently ascertained to be as high as 147° F.

The thermal water is used for baths and douches at different temperatures. It is sometimes employed internally, and it is likewise used to form hot vapour baths, general and local, for the treatment of chronic rheumatic affections, &c.

The mud of the 'mud baths,' for which Dax has a great reputation, is formed by the action of thermal water on the banks of mud left from the periodical inundations of the river Adour. These baths are used for chronic rheumatism, stiff joints, neuralgias, sciatica, uterine, and hysterical nervous affections. They are given at a temperature of 86° to 113° F., and occasionally even as high as 122° F. Local applications of the mud are preferred to the ordinary mud baths, according to Dr. Larauza, in very anæmic or in extremely plethoric persons, in cases where only one joint is affected, in cases where some region (such as the cervical or scapulo-humeral region) is affected, but cannot be immersed in the ordinary mud bath, in cases where some grave

[1] Part of the old Gallo-Roman walls of Dax still exists.

cardiac or other affection renders the ordinary mud bath inadvisable, and finally in certain very chronic affections, where very long application to the affected part is required (such as some cases of chronic synovitis, &c.).

From Saint-Pandélon, about three miles distant, a brine is conducted subterraneously to Dax, very similar to that of Briscous (see Chapter VII., under Biarritz); it is used for baths and douches at different temperatures in a separate well-arranged establishment adjoining the Casino. Scrofulous and delicate persons may thus be treated.

The Grand Hotel des Thermes (facing the Casino and the establishment for brine baths) provides thermal and mud baths and hydrotherapeutic treatment. So does the Baignots establishment.

The climate somewhat resembles that of Pau, but is slightly warmer and more humid. Dax is therefore occasionally used also as a climatic station, and is open all the year, forming a winter as well as a summer resort. The mean winter temperature is about 46° F.

Access: *Viâ* Paris and Bordeaux; about 24 hours.

Doctors: Albert Larauza, Maurice Delmas, &c.

Bagnères-de-Bigorre (France, Hautes-Pyrénées) will be described in the earthy group (Chapter XV.)

Ussat (France, Department of Ariège) lies at an altitude of 1,400 feet in the valley of the river Ariège. Its weak alkaline earthy water (temperatures in the baths form a series of 89·6° to 100·4° F.) may be ranked in the indifferent thermal group, and is chiefly employed in the form of baths of running water and douches for chronic gynæcological and hysterical affections. Ussat, likewise famous for its immense cavern of Lombrive, where remains of prehistoric man have been found, is a station on the railway between Toulouse and Ax, about 14 miles from the latter place.

Doctor: Cenac.

Bagnoles-de-L'Orne (France, Department of Orne) lies at an altitude of 530 feet amidst the picturesque

country called the 'Norman Switzerland.' Its weakly mineralised waters, having a faint odour of sulphuretted hydrogen, may be classed in the simple thermal group (temperature 81° to 84° F.). Drs. Doyon and Spillmann in their French translation of our book mention that the waters have a reputation in phlebitis. The medical men of the spa have made a special study of the constitutional tendencies to chronic phlebitis. Bagnoles is a station on a branch line from Briouze of the railway between Paris and Granville.

Bormio, in North Italy, lies in the upper Valteline valley (Stelvio route), near the Swiss and Tyrolese frontiers, on the southern slope of the Stelvio. The altitude of the New Baths is about 4,500 feet; the Old Baths lie about 200 feet higher. The springs contain a small amount of bicarbonate of calcium and of the sulphates of calcium and magnesium, but may conveniently be classed with the simple thermal waters (temperature 91° to 105° F.). They have a reputation in cases of chronic rheumatism, gout, and the uric acid diathesis, also in chronic cutaneous eruptions. Douches and mud baths are employed, as well as the thermal baths.

At Santa Catarina (Chapter XII.), about three miles distant, are chalybeate waters, sometimes used by anæmic patients residing at Bormio. The climate aids the cure in scrofulous and neurasthenic patients. Owing to the sudden fluctuations in temperature, warm clothing must be brought. The season lasts from June 1 to the end of September.

Access: From the railway station of Sondrio by diligence in 10 hours; from the station of Meran in 17½ hours; or from the station of Landeck in 22 hours. From Chur over the Albula or Julier pass to Samaden and over the Bernina pass to Bormio in 24 hours.

Accommodation: Good.

Doctors: There is generally an English doctor from the Riviera during the season.

Battaglia (Italy, Province of Venice) is situated in

the eastern district of the Euganean Mountains.[1] The excavations in the rocks here are partly artificial. They are used, in a similar way to the better known caves of Monsummano, as vapour baths, with a temperature of 110° to 116° F. The four springs, having a temperature of 136° to 160° F., contain, according to Schneider (1874), 1·5 per mille common salt, but no sulphur, as they were formerly supposed to do; they are similar to those of Baden-Baden, but still more weakly mineralised, and are best classed amongst indifferent thermal waters. Chronic gout and rheumatism and rheumatoid arthritis are treated. For bronchial catarrhs there is a special room for the pulverisation and inhalation of the waters. Local mud baths are employed in a similar way to those of Abano and Acqui; these mud baths of Battaglia have become quite famous, and the mud ('fango') is exported to several other spas and to some great cities, such as Berlin, for patients who cannot come to Battaglia. Massage can be performed in suitable cases. The chief season is from the beginning of May to the middle of October, but the baths are open all the year.

Access: By railway *viâ* Macon, Turin, and Milan, or by Bâle and Milan; Battaglia is a station on the railway between Padua and Bologna.

Accommodation: Fair.

Doctors: Pezzolo, &c.

Monsummano (Italy, Province of Lucca) lies in the Val di Nievole, about half-an-hour distant from the railway stations of Pieve and Monte Catini. Here is a large cave, a natural vapour bath filled with steam arising from large surfaces of hot water. It is used in the treatment of rheumatic affections, sciatica, neuroses, &c. The temperature in different parts of the cave ranges from 84° to 95° F. The cave was discovered in 1849, and the successful treatment of Garibaldi helped in giving it a reputation. There is accommodation for patients in

[1] The term 'Euganean thermæ' includes Battaglia, Abano, and some less known springs. (See under *Abano*.)

Upper and Lower Monsummano and at the neighbouring spa of Monte Catini.

The season is from the middle of May to the middle of September.

Valdieri (North Italy, Piedmont) lies at an altitude of 2,700 feet in the valley of the Gesso, 5½ hours' distance south-west of the railway station of Cuneo. Of its thermal springs, the Sorgente San Lorenzo has a temperature of 156° F. The waters are used internally and externally; a slimy substance or mud, consisting partly of organic material, is collected from the bottom of the springs, and employed in the form of local or general applications to the skin, like the muds of Battaglia, Abano, and Acqui. The affections treated at Valdieri include skin diseases, chronic rheumatism, rheumatoid arthritis, and scrofula.

Pré-Saint-Didier (Northern Italy, Duchy of Aosta), near Courmayeur, lies at an altitude of about 3,000 feet, and possesses weakly mineralised thermal waters (95° F.), used for bathing only.

Vicarello, 16½ miles from Rome, has thermal waters of 113° F., which are said to be the Aquæ Apollinares of Roman times.

Ischia and **Pozzuoli**, in Italy. See amongst the muriated-alkaline waters (Chapter IX.)

Panticosa, in the Spanish Pyrenees (altitude 5,600 feet), is described amongst the sulphur baths in Chapter XIV.

Fitero (Spain, Province of Navarra) possesses weakly mineralised waters (temperature about 117° F.), which have a reputation in the North of Spain for chronic rheumatism, &c. They contain apparently under ·5 per mille solid constituents, and may be classed in the indifferent thermal group.

Caldas-de-Oviedo (North of Spain, Province of Oviedo) possesses indifferent thermal waters (temperature 109° F.), containing, like many waters of this class, a considerable quantity of free nitrogen gas.

Sacedon, or La Isabella (Spain, Province of Guadalajara), possesses thermal waters (temperature 84° F.), containing a total of about ·75 per mille solids, chiefly sulphate of calcium. These waters, which were known to the Romans and the Arabs, are here classed in the indifferent thermal group.

Caldas-de-Gerez (Portugal, Province of Minho) lies in the mountains of Gerez, and possesses very hot weakly mineralised waters, which contain carbonic acid gas and a little iron. The water runs into hollows cut into the rock, and is used in the form of hot baths for chronic rheumatism and neuralgias. It is likewise taken internally. The accommodation might be much improved.

Abbas-Tuman (Russia), in the central government of Tiflis, is situated amidst pine forests in the Caucasus, at an elevation of 3,505 feet above sea-level. It has indifferent thermal springs (110° to 120° F.) and a military thermal establishment.

CHAPTER VII

MURIATED OR COMMON SALT WATERS

External use.—Salt baths have a more stimulating action than baths of plain water. The salt water soaks through the epidermis and acts as a chemical excitant to the nerve-endings in the skin; to this is partly due the special stimulating effect of sea water (the ordinary natural salt water for bathing) as compared with river water. In some sensitive skins too much irritation may be caused, giving rise to urticaria or increasing an eczematous eruption.

The 'Soolbäder,' or brine baths of Germany and other countries, to some extent take the place of sea baths in inland districts, and like sea baths are employed in scrofulous, rickety, and various cachectic conditions, requiring stimulant treatment. The natural brine springs vary [1] in strength; and besides common salt, contain, like sea-water, smaller quantities of many other salts. (See p. 18.) The stronger brines are often diluted with plain water for baths, and the weaker ones are artificially strengthened by the addition of a concentrated muriated water ('gradirte Soole'), or of a 'Mutterlauge,' [2] that is, the concentrated solution of

[1] The degree of saturation with common salt is actually or almost reached by brines like those of Droitwich, in England, and Rheinfelden, in Switzerland.

[2] The German term, 'Mutterlauge' (French: 'Eau-Mère'; Italian, 'Acqua Madre') has been generally used in preference to the English 'Mother Lye' or 'Mother Water.' The English terms are hardly ever employed; indeed, on reading a notice of Woodhall Spa, in England, we observed that the German word 'Mutterlauge' was used.

salts—calcium chloride, &c.—left when most of the common salt has been made to crystallise out. (See under KREUZNACH.) The different 'Mutterlauges' vary considerably in the relative proportion of their constituents, amongst which besides calcium chloride are the remnant of common salt and the chlorides of magnesium, potassium, strontium, and lithium, likewise bromides, iodides, &c.

Some authorities fearing to cause too much irritation prefer comparatively weak brines to the stronger ones, but H. Keller, M. Mayer, and others, point out that strong brine baths, such as are in favour at Rheinfelden, Droitwich, Ischl, Salies-de-Bearn, &c. may be used with care in a great number of cases without any of the bad results of excessive stimulation being observed. The individual reaction of each patient to salt baths must, however, always be considered.

Muriated springs sometimes contain excess of free carbonic acid gas, and to the presence of this gas in the gaseous warm salt baths ('Thermal-Soolbäder') of Nauheim and Oeynhausen, the mechanical stimulating effect of these baths is largely due. It is this effect which is made use of at Nauheim (*q.v.*) in the treatment of cardiac affections.

When taken internally, salt waters (cf. p. 32) exercise a gently stimulating effect on the gastric and intestinal mucous membranes, increasing peristalsis and rendering the contents of the bowel more fluid. The direct effect on the gastric mucous membrane is increased by the large amount of carbonic acid gas present in some of these waters. The laxative action on the bowels varies much in different individuals.

By some power, it is supposed, of facilitating the digestion of albuminous materials they tend to increase the general nutrition. At any rate, unless they are taken in quantities which produce catarrh of the stomach and intestines, they do not cause emaciation, and by this circumstance differ greatly from the sulphated waters.

We have, on the contrary, often seen increase of weight in thin persons as well during as after well-arranged courses of muriated waters. Muriated waters are, therefore, *cæteris paribus*, in spare or emaciated persons preferable to alkaline sulphated waters. Much of the apparent effect of all these waters on the general metabolism must, however, depend on the diet of the patient whilst undergoing the cure. (Cf. p. 178.)

These waters are used in cases of anæmia where iron is badly borne, in cases of Indian cachexia, and in convalescence from infectious diseases. It may be noted here that some gaseous muriated springs (*e.g.* at Homburg, Châtel-Guyon, &c.) contain a very fair amount of bicarbonate of iron.

The presence of iodides and bromides in some muriated waters, Wildegg in Switzerland, Adelheidsquelle at Heilbrunn, Woodhall Spa in England, Hall in Austria, Kreuznach, &c. has been supposed by some to exercise a special alterative action in various cachectic conditions, and even in syphilitic affections, though the quantities of iodide which are taken in the form of mineral waters seem extremely small, when compared with the doses given in ordinary medicines for the latter affection. (For the use, however, of muriated waters in syphilis, chiefly in the form of warm baths, see p. 386.)

Owing partly to their diuretic and laxative effects, muriated waters are useful in relieving the abdominal circulation and removing engorgement of the liver and of the hæmorrhoidal vessels. They may thus be useful in some cases of dyspepsia and gastric catarrh, especially in older persons, in hæmorrhoids, in chronic uterine complaints and in certain cases of chronic headache. Von Noorden ('Practitioner,' 1896) points out that in addition to their action in cases associated with constipation these waters may be useful in apparently opposite conditions, as in 'mucous' affections of the lower bowels.

According to C. Dapper and Von Noorden, muriated waters, such as those of Homburg, Kissingen, &c. can be of service in gastric disturbances associated with hydrochloric hyperacidity, as well as those associated with hypo-acidity. Von Noorden recommends them when the hyperacidity occurs in young men with gastric neurasthenia and gastric hyperæsthesia, and with a consequent dread of taking food freely, a kind of nervous dyspepsia (or neurotic form of gastric hyperacidity).

The *combined external and internal* use of muriated waters is serviceable in tendencies to catarrh of the gastric, intestinal, and respiratory mucous membranes, and in tendency to rheumatic fever. (See under NAUHEIM.) In these cases the skin is 'strengthened' and becomes less sensible to winds and draughts and to slight changes in the temperature and moisture of the air. In bronchitis the waters may be inhaled (see p. 38), and make the secretion of the bronchial tubes less viscid, promoting expectoration. In emphysema and chronic bronchitis the good results of the 'Thermal-Soolbäder' are probably partly due to their effect on the heart's action and general circulation.

The occasional occurrence of acute attacks of gout when gouty patients commence a course at Wiesbaden, &c. can hardly be attributed to the sodium chloride contained in the water, since thermal baths of other groups may likewise cause temporary exacerbation of the malady.

For use in rheumatoid arthritis, sciatica and neuralgias, the hotter springs are more beneficial.

The muriated sulphated waters of Brides-les-Bains, Leamington, Cheltenham, &c. are in their action somewhat akin to members of this group. (See Chapter XI.) In the present group, Droitwich, Nauheim, Kreuznach, Homburg, Wiesbaden, Kissingen, and Baden-Baden, have been placed first, as being at present amongst the best known and most representative spas; they have been somewhat more fully discussed than the other members

of the group, which are arranged in the geographical political order adopted in the previous chapter.

Droitwich (England, Worcestershire).—Droitwich, in England, like Rheinfelden, in Switzerland, possesses a brine which may practically be regarded as a saturated solution of common salt, and which may be taken as a type of the strongest brines (German: 'Soolen'). According to the analyses, the Droitwich brine contains 31 per cent. of common salt, that is, about ten times as much as sea-water. It is impossible to sink in such water unless a weight be attached to the body; the specific gravity [1] may be compared to that of the waters of the Dead Sea. The Droitwich water contains likewise about 5 per mille sulphate of sodium, and 1·3 per mille sulphate of calcium.

The country is very pleasant, though the old town is not beautiful. Owing to the dissolving process which perpetually goes on in the underlying salt beds, buildings gradually sink, and the level of the ground is changing.

Ordinary methods of heating such concentrated brine cause, owing to evaporation, a partial precipitation of the salt. The water has therefore to be heated by the addition of hot water before being used for bathing purposes. The time of immersion in the warm baths is about twenty minutes; they are usually given at a temperature of 98° to 101°. They are employed in muscular rheumatism, sciatica, and in chronic rheumatic and gouty affections, and exert a tonic effect in convalescence from acute illnesses. The treatment may sometimes in

[1] A. E. Garrod found the specific gravity of a specimen of Droitwich brine to be 1·195. The specific gravity of Rheinfelden brine is 1·205 according to Bolley; that of the Dead Sea is said to range between 1·172 and 1·227. All these waters are practically saturated solutions, and so is also the 'Big Rapids' American Water, Michigan, U.S.A., advertised as being 'the strongest natural medicinal water known,' which, according to the *Lancet* (January 4, 1896, p. 40), has a total mineralisation of 33·8 per cent., and contains, in addition to common salt, some calcium chloride, magnesium chloride, and bromide of sodium.

gouty patients provoke an acute attack of gout, a fact which is occasionally observed at many other spas. The 'Nauheim treatment' for heart affections can also be obtained.

The undiluted water, if taken internally, exercises a very disagreeable irritative and purgative effect.

The baths are open all the year round, but the summer months are preferred for treatment.

Access: From Paddington Station (London) in about five hours.

Accommodation: Fair.

Doctors: Cuthbertson, Jones, Corbett, &c.

Nauheim, Bad-Nauheim (Germany, Grand Duchy of Hesse).—Nauheim lies at an altitude of about 400 feet to the east, and at the foot of a projecting spur of the Taunus range. The value of Nauheim as a spa was first made generally known in 1859 by the late Professor Beneke, but it is owing to the writings of the brothers Schott that the spa has of late years become so notorious in England.

The different springs at Nauheim vary much in their balneo-therapeutic qualities; four are used for drinking, and three for baths. The two used chiefly for drinking are the Kur-Brunnen and the Karls-Brunnen, which have lukewarm waters containing about 1 to $1\frac{1}{2}$ per cent. common salt, 1 per mille chloride of calcium, and are effervescent with free carbonic acid gas. The Ludwigs-Brunnen is a weakly mineralised muriated alkaline gaseous water, useful as a table water, especially in dyspeptic troubles or for diluting the two first-mentioned waters. The fourth spring, the Schwalheimer-Brunnen (1·3 per mille common salt, ·13 earthy bicarbonates, ·01 bicarbonate of iron), within easy reach of Nauheim, supplies a cold slightly chalybeate, gaseous water, which may be used as a table water, especially in anæmic cases. Both these waters are sold in bottles in all the hotels and pensions of the town.

The waters used for the baths contain about 2 to 3

per cent. chloride of sodium, 2 to 3 per mille chloride of calcium, some bicarbonate of iron, and much carbonic acid gas. The temperature of the waters is 82° to 95·5° F. Two of these springs rise in jets from the ground, and hence have been named respectively the Great and the Little Sprudel; they are rich in carbonic acid gas, one of them containing 1,340 cubic centimetres to the litre of water.

Different kinds of baths are given: a simple salt bath, the carbonic acid gas having been allowed to partially or nearly completely escape [these baths may be given at different temperatures, and strengthened, if necessary, by the addition of 'Mutterlauge']; an effervescent bath (the Sprudel bath); and an effervescent wave or surf bath (the 'Sprudelstrom' bath). The latter (a speciality of Nauheim) is the most stimulating; the Sprudel water used for it is conducted direct from the spring into the bath.

There is now a separate bath-house for the simple salt baths. Besides the baths there are rooms for inhaling the waters and 'Gradirhäuser,' by which the patients can sit, as at Kreuznach, Kissingen, Reichenhall, &c.

A great many different affections can be treated at Nauheim. Scrofulous and rachitic children, convalescents, patients with functional nervous disorders, those with chronic catarrhal affections of the respiratory and alimentary tracts are treated here as at other common salt water spas. In neuralgic affections the hotter baths are useful. The gynæcological affections likely to be benefited by salt baths can of course be treated at Nauheim. Bronchitic patients may inhale the waters or sit by the 'Gradirhäuser.'

In disorders of the digestive system, drinking the water of the Karls-Brunnen plays a similar part to drinking that of the Elisabethen-Brunnen, in Homburg. When the undiluted water of the Kur-Brunnen is likely to induce a catarrh of the bowels, it may be diluted, preferably with the Ludwigs-Brunnen, according to

Beneke's plan, and then is said to resemble the water of the Rakoczy spring in Kissingen.[1] The muriated waters are usually taken before breakfast, either diluted or undiluted, in amounts of from 5 to 30 ounces. The Schwalheimer-Brunnen and Ludwigs-Brunnen may be taken later in the day, and form agreeable table waters.

In lingering results of acute or subacute rheumatism the various baths are useful in promoting absorption of the remaining products of exudation in the joints, and, according at least to Beneke's views (1872), in promoting absorption of the lymph from the affected cardiac valves. By their general tonic action on the system they probably also help in counteracting any tendency to relapse.

The stimulating effect of the Nauheim 'Sprudel' baths on the circulation enables them to be given at a lower temperature than ordinary baths : [2] this effect is due to a reflex action from the skin, which is stimulated by the combined action of the salts, the bubbles of carbonic acid gas, and, in the case of the 'Sprudelstrom' bath, by the movement of the water. The salt water soaks through the superficial layers of the epidermis, and acts as a chemical irritant to the nerve-endings in the skin, whilst the carbonic acid gas and the movement of the water act as mechanical stimulants.

It is indeed to the treatment of disorders of the heart and circulation, as systematically elaborated on Beneke's lines by the Brothers Schott, that Nauheim owes much of its present reputation. According to this method, the baths are often employed in conjunction with gymnastic exercises, and the effect of prolonged courses of this treatment is said to resemble that of digitalis. By the Nauheim method of treatment, subcutaneous

[1] Patients, however, themselves have stated that they have found the action quite different.

[2] The term 'Thermal-Soolbæder,' applied to Nauheim and Oeynhausen, simply means warm common salt baths, but is usually taken to imply also that the water is rich in carbonic acid gas.

œdema and effusions into the peritoneum and pleuræ, which are associated with imperfect action of the heart, or even with commencing failure of compensation in valvular diseases, have often been successfully treated. The heart's action gains in strength and regularity, whilst the œdema and other signs of imperfect action gradually disappear.

Care is necessary in beginning the baths. Dr. Theodore Schott says it is advisable to begin with 1 per cent. salt baths free from carbonic acid, and at a temperature of 92° to 95° F., the baths lasting six to eight minutes, and being followed by rest. They should be omitted for a day at frequent intervals. The temperature at which the baths are taken may be reduced gradually, from day to day, until 85·5° F. in suitable cases is reached, whereas the proportion of the solids they contain and the time of immersion are slowly increased. Later on in the cure the 'Sprudel' bath may be commenced, and finally the still more stimulating 'Sprudelstrom' bath. The whole course should last six weeks or more.

The exercises devised by the Brothers Schott form a system of 'voluntary movements with resistance,' similar to P. H. Ling's Swedish system of 'Widerstands-gymnastik,' but differing from the exercises in which Dr. Zander's 'medico-mechanical' appliances (those used for voluntary movements) are necessary, by the fact that the 'Widerstand' or resistance is supplied not by the weight attached to a lever or pulley, but by the hand of the doctor or skilled attendant supervising the exercise. In dilated hearts the immediate result of about ten minutes' exercise is often a diminution in the superficial area of cardiac dulness. This diminution does not last, and it would be out of place here to discuss its therapeutic significance,[1] but what is much more important

[1] Dr. Schott has, as far as the employment of Röntgen's rays will permit, succeeded in demonstrating to the eye the diminution in the size of the heart, which may be the immediate result of either Nauheim

is the satisfactory result which often follows a prolonged course of this treatment in suitable cases of the class mentioned above. There appears to be considerable danger, however, of patients with heart disease and insufficient compensation of such a severe character that rest in bed is absolutely necessary, being injudiciously recommended to try the Nauheim treatment.

The doctrine of the mode of action of this treatment opens up very difficult questions. In the first place it may be pointed out that any, even temporary, improvement in the action of the heart leads not only to a better circulation in the body generally, but also in the heart itself. *Severe* coronary artery disease must on the other hand necessarily be an insuperable obstacle to a favourable result. In the second place, we may remember that in most cases of deficiency in the heart's driving power (with or without mechanical defect by valvular disease) there are other factors as well which help to bring about the general morbid condition of the patient. The kidneys and skin may not be acting properly, and there may be disorders of the digestive system, all of which may interfere with the general nutrition of the body, and of the heart, as well as of the other organs. The careful use of the baths and exercises may help in removing these troubles, and so indirectly as well as directly act favourably upon the nutrition of the heart, and of the body generally. A laborious investigation of the metabolism of the patients during treatment is needed for the further elucidation of the exact action of baths

exercises or Nauheim baths. (See *Deutsche Med. Wochenschr.* 1897, No. 14.) Dr. M. Heitler believes that spontaneous variations sometimes occur in the dulness of normal hearts. See 'Die Percussionsverhältnisse am normalen Herzen,' *Wiener klin. Woch.*, 1890, p. 787. Dr. A. S. Eccles (*West London Medical Journal*, 1896, p. 227) suggests that by the excitement of the doctor's first examination the cardiac area and frequency of pulse may be temporarily increased, but quickly return to their previous state, as the patient's mind becomes occupied by the baths and exercises. Perhaps part of the great diminution in the cardiac area, which the doctor sometimes finds before leaving the patient, may, in excitable patients at least, be explained in this way.

and exercises (both active and passive exercises) in cardiac affections. Such observations made on healthy individuals would not be sufficient, but they should be made[1] on the patients themselves whilst undergoing a course of the treatment, and on patients suffering from different forms of cardiac affections, both those accompanied and those unaccompanied by valvular lesions. Of great value for this purpose would be the regular daily examination of the urine, as to its total quantity, specific gravity, and richness in urea, uric acid, and albumen (if present), and lastly, also, as to the variations in its specific toxicity, during the treatment.

In certain cases the baths appear to act favourably, whilst the exercises do no good (see Dr. W. A. Sturge, 'British Medical Journal,' 1895, vol. i. p. 527, and the paper by Dr. R. Saundby, 'British Medical Journal,' 1895, vol. ii. p. 1081); in other cases exercises act best.

At the end of a course of Nauheim treatment, and in order to further the beneficial result, the local doctors can make use of carefully graduated climbing exercise, for which there are facilities in the neighbouring footpaths.

Dr. Siegfried employs graduated cycling exercises in certain cases. For this purpose he has introduced a tricycle, the treadles of which can be adjusted to revolve in smaller or larger circuits so to meet the special requirements of individual cases. When pushed along by an attendant the tricycle serves as a machine for passive movements of the lower extremities.

The Nauheim season lasts from May to the end of September.

Access: To Frankfurt in about 19 hours; thence about one hour by train.

Accommodation: Good.

Doctors: Schott, Abée, Groedel, Beste, Bode, Schröder, Baur, Bruck, Schuster, M. Siegfried, &c.

[1] As Von Noorden has pointed out with reference to other investigations into the action of remedies.

Kreuznach (Germany, Rhenish Prussia).—Kreuznach (altitude 340 feet) lies on both banks of the Nahe, about ten miles from its entrance into the Rhine. The town proper is somewhat cramped and old-fashioned, and its drainage arrangements are said not to be quite satisfactory, but Bad-Kreuznach has roomy streets and villas. The latter constitutes the south-western portion of the town, lying partly on an island, partly on the right bank of the river, at the commencement of the narrower portion of the Nahe valley; it has a special railway station of its own, and patients may avoid the old town as much as they like. About one and a half mile southwards up the Nahe, in the narrower part of the valley, lies the village of Münster-am-Stein (altitude 380 feet), with similar mineral springs to those of Kreuznach, but hotter. The bold porphyry cliffs of Rothenfels and Rheingrafenstein, with the ruins of Sickingen's Castle of Ebernburg, and that of the Rheingrafen, make the scenery towards Münster-am-Stein very striking. The climate of Kreuznach is extremely mild; too hot for some persons in the height of summer. The hill-slopes in the neighbourhood are mostly vineyards, and do not afford the shady walks which might be desired for patients; one has to walk some distance on to the hills to reach woods which offer protection from the sun; shade amongst the trees may, however, be obtained in the Kurgarten, which is about to be enlarged in the direction towards Münster-am-Stein.

The waters of Kreuznach contain about 10 per mille common salt and about 2 per mille chloride of calcium, together with minute quantities of chlorides of strontium, barium, &c., bromide and iodide of sodium, traces of arsenic, &c.; the latter constituents probably not being present in sufficient quantity to exercise any special therapeutic effect. The springs are numerous, but the cold Elisabethquelle (10 per mille common salt and 1·9 per mille chloride of calcium, according to the 1894 analysis by R. and H. Fresenius) is the spring chiefly

used for drinking, and in the cold water the salt taste is not so disagreeable to the palate as it would be in the case of tepid springs. Two or three glasses are drunk, by preference on an empty stomach before breakfast, but naturally the dose varies according to the age and complaint of the patient. The baths are warmed to the required temperature, and usually strengthened by the addition of 'Mutterlauge,' that is, a strong solution of salts left when most of the common salt of the Kreuznach water has been made to crystallise out: the Kreuznach 'Mutterlauge' contains about 20 per cent. of chloride of calcium. Owing to the action of the 'Mutterlauge' on stone and porcelain, wooden tubs have to be employed for the baths. The supply of mineral water is so great that all the hotels and most of the houses are supplied with it.

In the Kurhaus are excellent newly-built hot air and vapour baths, with arrangements for douches and massage; there is likewise an inhalation room, in which the air is charged by the Wassmuth method with the very finely pulverised mineral water, and where patients recommended to inhale the water may sit dressed in their ordinary clothes, protected by a loose outer oil cloth. Between Kreuznach and Münster-am-Stein are many 'Gradirhäuser,' where patients may sit on the side away from the wind; these 'Gradirhäuser' are high fences formed by bundles of twigs, through which the water is made to drip so as to concentrate it as a preliminary to heating it over a fire in the process of obtaining common salt and 'Mutterlauge'; as the water drips, the impetus of the falling drops and any wind there happens to be, carry fine particles of the water into the surrounding air, which are inhaled by patients seated in the immediate neighbourhood, just as fine particles of salt water are inhaled by persons at the seaside.

Amongst the affections treated at Kreuznach the various forms of scrofula and rickets take the chief place.

The Victoria Hospital is a charitable institution under the patronage of the Empress Victoria, where during the year about six hundred poor scrofulous and other children can stay for about four weeks, and besides the baths can receive operative and other treatment if necessary. It resembles (except in climate) seaside children's sanatoria, such as those at Margate in England, Norderney in Germany, and Berck-sur-Mer in France (see Chapter XVII.)

Many patients come to Kreuznach for chronic catarrh or tendency to catarrh of the throat, nose, larynx, and bronchi. In this class of cases the inhalation room can be used, and the mild climate must help greatly in the results obtained, though higher altitudes are often preferable. Syphilis and chronic cutaneous affections are treated at Kreuznach with salt baths, as they are at many other spas. On the subject of the possible utility of the calcium chloride of the purified 'Mutterlauge' in certain cases of recurrent urticaria, &c. see p. 446.

The spa is largely resorted to for chronic catarrhal and chronic inflammatory conditions of the female generative organs and the remnants of pelvic cellulitis. It is not seriously maintained in Germany at present that the spa treatment has power to produce absorption of fibroid or other tumours of the uterus, though doubtless it may diminish the troubles connected with swelling and inflammatory changes around them; in gynæcological complaints as well as in other complaints treated at Kreuznach, the physicians are ready to aid the action of the waters by ordinary well-recognised methods of treatment. The hot air and vapour baths are useful in the treatment of some obese patients. The season lasts from May 1 to the end of September.

Access: By train in about 19 hours *viâ* Cologne and Bingerbruck, or *viâ* Metz. Patients should get out at the Bad-Kreuznach station.

Accommodation: Very good.

Doctors: Hessel, Engelmann, Markwald, Prieger, Heusner, von Frantzius, Vollmer, &c.

Homburg, Homburg vor der Höhe (Germany, Prussian Province of Hesse-Nassau).—Homburg lies at an altitude of about 600 feet, protected on the west by the Gross-Feldberg, Alt-König, and other heights of the Upper Taunus, and on the north partially sheltered by lesser heights. Owing to its open position the air is 'fresh.' The throng of visitors who resort to Homburg, as a place of amusement and fashionable society, cause its character as a health resort to be somewhat modified.

The springs are comparatively cold; those used for drinking are the Elisabethen-Brunnen, the Kaiser-Brunnen, the Ludwig-Brunnen, the Luisen-Brunnen, and the Stahl-Brunnen, all of which are rich in carbonic acid gas. The Luisen-Brunnen and the Stahl-Brunnen are muriated chalybeate springs containing much CO_2. The Stahl-Brunnen is the richest of the two in iron (about 5 per mille common salt, 1 per mille bicarbonate of calcium, and ·09 per mille bicarbonate of iron), and is compared to the Wein-Brunnen at Schwalbach; both the Stahl-Brunnen and the Luisen-Brunnen smell slightly of sulphuretted hydrogen, like the Pouhon of Peter the Great at Spa. The other three springs give forth effervescent muriated waters, *i.e.* the ordinary Homburg waters. These, in addition to common salt, contain small quantities of the chlorides of calcium and magnesium, and of bicarbonate of iron. The Elisabethen-Brunnen, the one most generally used, contains about 1 per cent. of common salt.

The baths now used are of metal, so arranged that the water can be warmed from a hot steam chamber at the bottom with the least possible escape of carbonic acid gas. There are inhalation rooms and douche arrangements.

Amongst the patients who resort to Homburg are those with gouty affections and the uric acid diathesis,

some with habitual constipation, for whom the alkaline sulphated waters of Karlsbad and Marienbad are too strong, and patients with catarrhal affections of the alimentary and respiratory tracts. Chronic rheumatism is likewise often treated at Homburg. The same class of gynæcological affections are benefited at Homburg as at other salt water baths. Troublesome cases of chronic headache are also sometimes relieved. The fashionable character of the spa renders it perhaps less suitable for scrofulous and rachitic children than other 'Soolbäder.' For overworked persons and excitable patients with functional nervous affections, quieter spas are often to be preferred.

The iron springs of Homburg are employed for anæmia and debilitated patients, either alone or in conjunction with the ordinary muriated waters; they may be conveniently taken after meals, whilst the muriated waters are taken, when possible, on a fasting stomach before breakfast. Such matters, however, must be specially ordered by the spa doctor to suit individual cases.

There are well-known establishments for Swedish gymnastics, massage, electrical treatment, &c. at Homburg. The season lasts from May to the end of September.

Amongst many pleasant excursions which can be made from Homburg is the particularly interesting antiquarian one to the Roman fortress of the Saalburg, about four miles distant.

Access: To Frankfurt in about 19 hours; thence about half-an-hour by train.

Accommodation: Very good.

Doctors: Deetz, Weber, Hoeber, Will, Schetelig, Friedlieb, &c.

Wiesbaden (Germany, Prussian Province of Hesse-Nassau).—Wiesbaden (altitude 380 feet), formerly the capital of the Duchy of Nassau, is a beautiful town with handsome public buildings and private villas, and well

laid-out grounds, where patients and visitors can promenade. It is protected on the north by the Taunus range, and the climate is fairly mild. Though in the midst of summer the heat is very great, there are numberless shady walks to be enjoyed in the woods of the neighbouring Taunus Mountains. These woods are carefully kept up, less for profit than for the recreation of the inhabitants and visitors of the neighbourhood. A recently constructed funicular railway up the Neroberg (725 feet), whence a beautiful view is obtained over the surrounding country and distant hills, carries one at once right into the Taunus forest.

The waters of Wiesbaden were known to the Romans, and were described by Pliny as the 'Fontes Mattiaci'; they are thermal common salt waters containing about 5 to 7 per mille of common salt. Their temperature varies from 100° to 156° F. The 'Kochbrunnen'[1] is the hottest spring, and the one probably most used for drinking. Other springs used for drinking are the Wilhelmsquelle, the Adlerquelle, and the Schützenhofquelle. About 24 different springs are used for baths; the supply is abundant, and many of the hotels have their own spring and baths. A thin ochreous scum settles on the surface of the water when allowed to stand, and occasionally there is the very faintest smell of sulphuretted hydrogen.

[1] The water sold in bottles as 'Wiesbadener Gichtwasser' is a preparation made from the water of the Kochbrunnen, the main difference being an addition of about 8 per mille bicarbonate of sodium in the former. The preparation has been most strongly recommended by Dr. Carl Mordhorst for the treatment of chronic rheumatism and gout. Both of these affections, he considers, are associated with the precipitation of urates in the affected parts, but whereas in chronic gout the uratic deposits contain crystalline urates (acid urate of sodium or biurate of sodium) in the form of needles and stellate groups of needles, he believes that in rheumatic cases there are deposits of 'globular urates' (that is, neutral urates, or at all events a combination of uric acid with sodium as a base, containing more sodium than the crystalline urates), which have usually escaped observation, on account of their non-crystalline form, when chronic rheumatic joints have been examined at necropsies.

Perhaps chief amongst the patients treated at Wiesbaden come those with chronic (atonic) gout and rheumatism. Chronic catarrh of the larynx and bronchi is likewise often treated at Wiesbaden; inhalation chambers are provided for these cases. Some kinds of dyspepsia and chronic diarrhœa derive much benefit from drinking the waters. Chronic inflammatory conditions of the female generative organs are treated by baths as at Kreuznach. Syphilis is made a medical speciality of after the example of Aachen. At the new 'Augusta Victoria Bad,' besides the ordinary baths, there are elaborate arrangements for hot air and vapour baths, douches, compressed air baths (for pulmonary emphysema, &c.), massage, Swedish gymnastics and electrical treatment, which can be employed in suitable cases.

Frankfurt, Mainz, and the spas of Schwalbach and Schlangenbad can easily be reached; the amusements of visitors are well looked after; and it is no wonder that Wiesbaden is thronged with patients and visitors. The spa is open throughout the year, but the hottest weeks of summer are to be avoided by most people.

Access: By train in about 18 hours *viâ* Ostend and Cologne, or in about two hours longer *viâ* Calais and Cologne.

Accommodation: Very good.

Doctors: Conrady, Wibel, C. F. O. Ziemssen, E. Pfeiffer, Schellenberg, B. Laquer, Honigmann, Mordhorst, and many others.

Kissingen (Bavaria).—Kissingen is beautifully situated in the fairly open valley of the Saale, at an elevation of about 600 feet above the sea-level. It is surrounded by wooded hills, where the so-called 'Terrain-Cur' can be taken, consisting in graduated gentle uphill and downhill exercise. The climate is mild.

Of the springs used for drinking the most important is the Rakoczy-Quelle, which yields a cold effervescent water, containing about 6 per mille common salt and

small quantities of the chlorides of potassium, lithium, and magnesium, and of the carbonates of iron (·03 per mille) and lime (1 per mille). The Pandur-Quelle is similar to the Rakoczy, but slightly weaker. The Max-Brunnen yields a pleasant, weakly mineralised, cold, effervescent water. All these three springs arise close together in the Kurgarten. The Rakoczy and Pandur waters, when a greater laxative effect is required, are recommended to be mixed with a product termed 'Kissingen bitter water,' obtained, according to a method of Liebig, from the 'Soole' springs. In catarrh of the stomach and bowels the water is warmed before drinking, though most of the carbonic acid gas escapes during the warming process.

The usual time for drinking the waters is the morning before breakfast between seven and nine, but a second dose is sometimes taken in the afternoon. Water from the neighbouring spa of Bocklet (Chapter XII.) is brought to Kissingen fresh every day, and may be given in cases when, owing to anæmia, a chalybeate water is considered suitable in addition to Kissingen water; it is usually taken later in the day than the Rakoczy and Pandur waters. The Max-Brunnen water is sometimes used merely as an agreeable aërated draught at various times of the day.

There are three bath-houses, two in the town and one in the valley close to the 'Gradirhäuser,' about one and a half mile to the north of the town; to the latter a small steam-boat runs during the season. The springs chiefly used to supply the baths are the Salinen-Sprudel, close to the 'Gradirhäuser,' and the Schönborn-Sprudel (11·7 per mille common salt, very rich in CO_2), further off, at the village of Klosterhausen; the Pandur-Quelle is also used for baths.

Different kinds of baths can be supplied: firstly, ordinary Soolbäder at different temperatures; secondly, Soolbäder rendered more stimulating by the addition of Kissingen 'Mutterlauge'; thirdly, 'Wellenbäder.' The water in the baths is heated by a coil of tubing

containing steam, and this method avoids any unnecessary escape of the carbonic acid gas. The waves of the 'Wellenbäder' are caused by a jet of water forced in through a hole in the bottom of the bath when the tap is turned on; with these baths are likewise provided a douche of Soole water and a shower bath of plain water. Mud baths and ordinary douches may likewise be obtained.

Carbonic acid gas collected from the water is employed to supply carbonic acid gas baths, the application of the carbonic acid atmosphere being, of course, confined to the body, so that very little, if any, can be inhaled. There are likewise rooms for inhaling the waters in the form of a very fine spray; the inhalation is employed in the case of patients suffering from catarrh of the respiratory organs, and such patients may likewise inhale the air near the 'Gradirhäuser.'

Patients are treated for various complaints at Kissingen; there are those suffering from hæmorrhoids and constipation, those with catarrhal conditions of the stomach or bowels, with or without a tendency to diarrhœa, gouty and rheumatic affections and functional nervous disorders, especially when supervening on an anæmic or scrofulous basis. The hot baths and hot mud baths are useful in neuralgic pains. Massage can be employed in suitable cases. In some cases of anæmia, especially those with tendency to constipation, the waters of the Rakoczy spring appear to act more beneficially than iron in the form of medicines or in the stronger iron waters. Anæmic conditions with enlarged spleen after malaria are sometimes benefited. Patients with chronic headache often derive benefit from Kissingen.

Some chronic skin eruptions are benefited by the baths, and the same class of gynæcological affections are treated as at other muriated springs; in these cases local treatment is, of course, often necessary, in addition to the balneo-therapeutic treatment. Poor scrofulous children are cared for at a charitable institution of the

town. Bronchitic affections have been already referred to. In the treatment of glycosuria, obesity, the uric acid diathesis, and the slight forms of commencing nephritis, which are occasionally seen at Kissingen, the diet has, of course, to be carefully regulated, and in such cases it is sometimes an advantage if the patient can be treated, not in an hotel, but at an institution under the direct care of a resident physician.

The water of the Schönborn-Sprudel, after being warmed to 86° F., still retains sufficient free carbonic acid gas to be used in cardiac cases, as Leusser points out, like the Thermalsoolbaeder of Nauheim (*q. v.*).

The season lasts from May to the end of September. Patients are sometimes sent for an 'after-cure' to the neighbouring chalybeate spas of Bocklet or Brückenau. For suitable localities in different classes of cases, the reader is referred to Chapter XXI.

Access: In about 27 hours *viâ* Aschaffenburg and Würzburg. *Accommodation:* Very good.

Doctors: O. Diruf senior, Gottburg, Stöhr, Sotier, E. Diruf, G. Diruf, Dapper, A. Rosenau, Scherpf, Leusser, and others.

Baden, or **Baden-Baden** (Grand Duchy of Baden).—Baden-Baden, so called to distinguish it from Baden in Switzerland and Baden near Vienna, was already known to the Romans as 'Civitas Aurelia Aquensis.' It lies at an altitude of about 650 feet, in a situation almost unrivalled for natural beauty, in the Oos Valley, close to the fertile plain of the Rhine. Though not completely sheltered from the north, its climate is mild, with early spring and late summer.

There are over twenty different thermal springs; their waters closely resemble each other in mineral constituents, and their temperatures vary from 124° to 150° F. The Hauptstollenquelle is the one most used for drinking, and contains 2 per mille common salt, ·05 per mille chloride of lithium, and a trace of arsenic (·0007 per mille arseniate of calcium). The lithium has been said to exercise a special therapeutic action in gout, and the

arsenic in skin affections; but it is probably more rational to regard the waters of Baden as simple muriated thermal waters, which, owing to their weak mineralisation, approach the indifferent thermal group of waters. If a laxative action be desired, Karlsbad, Marienbad, or Kissingen salts may be added to the Baden water.

The waters are much used for drinking, but still more for bathing. The Friedrichs-Bad and the Kaiserin-Augusta-Bad (the latter for ladies only) are amongst the finest, if not the finest, bath-houses in Europe. Here various kinds of baths may be had: ordinary thermal baths, strengthened by the addition of salt if necessary; the so-called 'Wild-bäder,' *i.e.* baths with a sandy floor, as at Wildbad, in which the thermal water is kept continually running to imitate bathing at a natural thermal fountain; hot air and vapour baths (for the vapour baths the natural thermal water is used); all kinds of douches and electric baths. In the Friedrichsbad is a very complete set of Zander's medico-mechanical appliances for 'Swedish gymnastics.' There is an institution containing chambers for compressed air. Local baths of mud ('fango') can be employed as at Battaglia.

The indications for Baden-Baden are: rheumatoid arthritis and chronic gouty affections in delicate subjects; the results of injuries to bones and joints, chronic skin affections, &c. in which ordinary thermal baths are useful; catarrhal and nervous affections of the digestive organs in delicate people, in whom the more active waters of Karlsbad, &c. are contra-indicated. For convalescents, cachectic conditions from malaria, emphysema, and chronic catarrh of the respiratory organs, the climate is likely to prove favourable. For emphysema and chronic bronchitis the use of the compressed-air chambers is said to be useful.

The neighbouring walks are suitable for a 'Terrain-Cur' in persons with weakly acting hearts from obesity, &c. On the hottest days cool walks in the dense pine forests can always be selected, and for those

patients who are able to make excursions of some hours' duration, the ruins of the old Castle of Baden, the porphyry cliffs close by, the ruins of Ebersteinburg, Schloss Eberstein, and Yburg are amongst the points on the neighbouring heights which may be visited.

Owing, however, to the beauty of the town itself, its handsome villas and hotels, the magnificent scenery around it, the numberless excursions which can be made, and the amusements it offers to the fashionable world, Baden must necessarily attract more ordinary visitors than patients. The chief season is from May 1 to the end of October, but there is also a winter season. Those invalids who do not bear heat ought to avoid Baden between the beginning of July and the middle of August. Baden is used as an intermediate station for those about to spend the winter in the south of Europe, and those returning from warmer regions to their colder homes.

Access: By railway, *viâ* Brussels or Paris and Strassburg, or *viâ* Cologne, in about 20 to 27 hours.

Accommodation: Good. Besides hotels and 'pensions,' there are two or three private sanatoria, where patients can be under the direct supervision of the physician.

Doctors: Schliep, Baumgärtner senior and junior, Frey, von Hoffmann, &c.

Woodhall Spa (England, Lincolnshire).—Woodhall Spa (altitude 37 feet above sea-level), noted for its cold muriated waters containing minute quantities of bromides and iodides, lies amidst a nearly level kind of moorland bordering on the fens. Owing to the flatness of the country, sea breezes reach it, though the spa lies actually about 23 miles due west of the coast, *i.e.* of the little seaside health resort of Skegness. The climate, like that of the east coast, is bracing, and the rainfall is moderate for England. The Scotch firs and woodland in the neighbourhood contribute to the healthiness of the situation. According to Professor Frankland's analysis of 1891, it

appears that the Woodhall waters contain 19·5 per mille common salt, 1·27 per mille chloride of calcium, 1·14 per mille chloride of magnesium, 0·4 per mille bromide of sodium, ·02 per mille bromide of potassium, and only ·0075 per mille of iodide of potassium (no free iodine).

Amongst diseases in which benefit has been obtained by the use of this spa are rheumatoid arthritis, muscular rheumatism, gouty affections, and catarrh of the respiratory and alimentary tracts; also scrofula and rickets, cases of leucorrhœa in women, and some skin affections. Dr. Williams found the water useful in fibroid tumours of the uterus, which is in accordance with results which have been claimed for the somewhat similar waters of Kreuznach, in Germany (*q.v.*). A 'Mutterlauge,' made from the Woodhall water, can be used like that of Kreuznach for local compresses or for strengthening the baths. The waters are likewise used for inhalation purposes in chronic pharyngeal and laryngeal catarrh, and for nasal douches.

The bath establishment contains arrangements for baths, douches, and the Aix douche-massage; crippled invalids can be lowered into their baths on a 'crane-couch.' The accommodation is good, and for those who are fit there are excellent facilities for golf, cycling, lawn tennis, &c.

Access: From King's Cross Station, in about four hours.

Doctors: C. J. Williams, H. W. Gwyn, R. Cuffe.

Ashby-de-la-Zouch (England, Leicestershire).—The mineral waters of this spa (altitude about 400 feet) were discovered in 1805, during the working of the Moira coal-fields in the neighbourhood. Their natural temperature is 62° F., and, according to Dr. B. H. Paul's analysis, they contain 18·7 per mille common salt, 2·2 per mille chloride of calcium, 1·6 per mille chloride of magnesium, 2·5 per mille sulphate of calcium, and ·08 per mille carbonate of iron. They are used for giving brine baths (much

weaker than those of Droitwich and Nantwich) at various temperatures.

The baths are employed in muscular rhuematism, in chronic rheumatic, gouty, and also scrofulous affections. Owing to the carbonate of iron in the waters, their internal employment might be useful in some conditions of debility. The bathing establishment is small, but there is comfortable hotel accommodation, and pleasant excursions can be made in the neighbouring country.

Access: From St. Pancras Station, London, in about three hours.

Doctors: Orchard, Stables, Williams, Barber, and Roe.

Malvern (England, Worcestershire) is supplied with brine from Droitwich. The Malvern Wells (especially St. Anne's Well)[1] were formerly famed for their supposed special medicinal effects, which were doubtless due in part to the drinking of a nearly pure water in excellent air, and in part possibly to faith. Great Malvern lies on the eastern slopes of the Malvern Hills, at an elevation of about 520 feet above the sea. Malvern Wells and Little Malvern lie respectively two and three miles to the south of Great Malvern. Great Malvern and the neighbourhood are much visited by convalescents and invalids for whom a tonic inland climate is suitable. The situation is beautiful, the accommodation comfortable, and there are plenty of excursions to be made in the neighbourhood.

Nantwich (England, Cheshire).—Nantwich (altitude about 120 feet) is situated in a pleasant well-wooded country. According to Frankland's analysis, the waters contain about 21 per cent. common salt, 2·2 per mille chloride of magnesium, 1·9 per mille chloride of potassium, 6·5 per mille sulphate of calcium, and 5·0 per mille sulphate of sodium.

The brine baths were opened in 1883, and resemble those of Droitwich, but the baths are heated with steam

[1] The waters of this spring are used for making aërated table waters.

instead of hot water, and are therefore given less diluted than at Droitwich. Cases of lumbago and muscular rheumatism often receive benefit from the treatment. The summer months are to be preferred.

Access: From Euston Station (London) in about four hours.

Accommodation: Satisfactory.

Doctors: Lapage, Munro, Mathews, &c.

The brine baths of STAFFORD (altitude about 240 feet) are similar to those of Droitwich. At SALTBURN-BY-THE-SEA, in Yorkshire, baths are employed of brine conveyed from the brine wells at MIDDLESBOROUGH. At MIDDLEWICH, in Cheshire, there are brine baths.

Other muriated waters in England are those of Filey, near Scarborough, Thorp Arch (or Boston Spa), in Yorkshire, and Admaston, under the Wrekin, in Shropshire.

Harrogate (England).—Some of the Harrogate waters might be mentioned in the muriated as well as the sulphurous group. (See Chapter XIV.)

Llandrindod Wells and **Builth Wells** (Wales, Radnorshire).—These spas are described amongst the sulphur springs. (See Chapter XIV.)

Llangammarch Wells (Wales, Brecknockshire).—This spa (altitude about 600 feet) possesses a muriated water, the so-called 'barium water,' containing chlorides of calcium, magnesium and barium. Dr. Dupré's analysis shows it to contain about 2·6 per mille common salt, 1·2 per mille chloride of calcium, ·3 per mille chloride of magnesium, and ·096 per mille chloride of barium (total solids, 4·3 per mille).

Llangammarch is situated at the southern foot of a range of hills, in a wide valley, fairly sheltered to the north and east. The air is fresh, and invigorating to those suffering from mental overwork. The water is used externally and internally, and might be useful in some cases of dyspepsia, and in chronic gout and rheumatism, especially where any emaciation is to be avoided.

Chloride of calcium has some reputation in chronic

glandular affections, &c., whilst chloride of barium, the speciality of the waters, is said to strengthen the heart's contraction whilst reducing its frequency. Dr. Ernst Sandow's (Hamburg) gaseous baths are made use of in suitable cardiac cases after the model of the Nauheim treatment.

The Llangammarch waters are exported, both plain and after being artificially aërated. In the latter form they are a pleasant drink at meals.

Access: In about seven hours from Euston Station.

Accommodation: Good.

Doctor: W. Black Jones.

Bridge-of-Allan, Airthrie (Scotland, Stirlingshire).—This spa (altitude about 40 feet) lies on the Allan at the south-western foot of the Ochil Hills, three miles to the north of Stirling, with which it is connected by railway and tram. Its muriated spring contains about 5·4 per mille common salt, 4·4 per mille chloride of calcium, and ·5 per mille sulphate of calcium.

It stands in a sheltered position, and is a favourite resort of the people of Edinburgh. Three tumblers before breakfast is the usual dose of the waters. They are heated artificially before being drunk, and are said to be aperient in action. The waters have a reputation for dyspeptic troubles, some of which, Dr. Macpherson hints, are due to whisky and oatmeal.

Doctors: Compson, Fraser, Paterson.

Innerleithen (Scotland, Peebles), on the River Tweed, about six miles below Peebles, has weak muriated waters, bottles of which can be obtained in London under the name, St. Ronan's table water. The muriated waters of Bridge-of-Earn (Pitkeathly), situated on the Earn (altitude about 30 feet), in a picturesque country, one and a half mile from Perth, contain free carbonic acid gas. 'Pitkeathly water' and 'Pitkeathly cum lithiâ' are waters prepared by the lessees of the Wells, and sold in bottles.

Mondorf, in the Grand Duchy of Luxemburg (altitude 650 feet), possesses a muriated water (temperature

77°) which, in addition to 8·7 per mille common salt, contains 3·1 per mille bromide of magnesium. The waters are used for drinking, bathing, and inhalation.

Oeynhausen, or **Rehme-Oeynhausen** (Germany, Westphalia).—The town lies in a broad fertile valley (altitude 230 feet) on the Werra, before it joins the Weser ; the time by railway from Hanover is about one hour and three-quarters, and from Cologne four and a half hours. Oeynhausen, the newer portion of the town, is the name by which the spa is now best known. The climate is fresh and mild.

The chief remedial agents are three muriated wells, termed Bohrloch I., Bohrloch II., and Bohrloch III., very rich in carbonic acid gas, with temperatures of 77° to 91·5° F., containing, according to Professor Finkener, 31 to 34 per mille common salt. Bohrloch No. I. (temperature 80·6° F.) contains about 32 per mille common salt, and 3 per mille each of the sulphates of sodium and calcium, and something like 1,000 volumes per mille of carbonic acid gas. The Bülow-brunnen are two cold muriated springs containing 34 to 80 per mille common salt. The bathing arrangements are very good, and by the mixing of the different waters together and heating them, if necessary, baths can be given at different temperatures and of various strengths in salt and gas.

So much do the remedial agents of Oeynhausen resemble those of Nauheim that it will not be necessary to repeat here what has been already said, when speaking of the latter spa, concerning indications for treatment. Owing to special treatment of heart affections, Nauheim has become much better known in England than Oeynhausen. The latter spa has, however, owing to the special attention paid to the subject by its medical men (J. Braun, L. Lehmann, &c.), and their writings[1] on the subject, acquired a considerable reputation in those cases of nervous affection which are suitable for spa-

[1] *Vide* L. Lehmann, ' Die chronischen Neurosen als klinische Objekte in Oeynhausen,' Bonn, 1880.

treatment. The chief season is from May 15 to the end of September; but there is likewise a winter season.

Doctors: Lehmann sen. and jun., Oetker, &c.

Soden, in the **Taunus** (Germany, Prussian Province of Hesse-Nassau).

Soden lies at an altitude of about 450 feet, seven miles to the west of Frankfurt-am-Main, just at the foot of the Taunus Mountains, which shelter it on the north. The climate is mild and equable. There are 24 different muriated springs, designated by numbers like those of Nauheim; they vary in amount of common salt (2·4 to 15 per mille), and in temperature (52° to 86° F.); some of them, as the 'Champagner-Brunnen' (6·5 per mille common salt), are very rich in carbonic acid gas; the 'Sool-Brunnen' contains 14·2 per mille common salt and comparatively little carbonic acid. These and the 'Warm-Brunnen' and 'Milch-Brunnen' (3 and 2 per mille common salt) are much used for drinking. Some of the springs contain an appreciable amount of iron; the 'Soolensprudel' (temperature 86° F.), used for 'Thermal-Soolbäder,' is rich in carbonic acid gas (1525 per mille volumes), and smells slightly of sulphuretted hydrogen. The bath-house is well fitted up for salt baths and gaseous salt baths, and there are inhalation rooms, on the Schnitzler and Wassmuth systems, for the use of patients with chronic laryngitis and bronchitis. Twenty minutes distant from Soden is the gaseous chalybeate spring of Neuenhain (·04 per mille bicarbonate of iron).

The spa is chiefly resorted to by Germans with chronic catarrhal affections of the air passages and emphysema. Other patients are scrofulous children and persons suffering from dyspeptic symptoms of catarrhal origin. Heart affections have not been made a speciality as at Nauheim. The season lasts from May to the end of September.

Soden is reached in half an hour by railway from Frankfurt. Accommodation is satisfactory.

Doctors: Otto Thilenius, W. Stoeltzing, M. Fresenius, H. Hughes, J. Koehler, &c.

As somewhat similar to the waters of Nauheim, Oeynhausen, and Soden, may be mentioned the gaseous thermal muriated waters of HAMM, KOENIGSBORN, and WERNE, in Westphalia.

Salzschlirf (Prussian Province of Hesse-Nassau), a station on the railway between Fulda and Giessen, is situated at an altitude of 820 feet in a pleasant valley to the north of the Vogelsberg. The muriated spring, 'Bonifacius-Brunnen,' used for drinking and bathing, according to Fresenius and Will, contains 10 per mille common salt, 1·5 per mille sulphate of calcium, about 1 per mille chloride of magnesium, ·21 per mille chloride of lithium, and about ·005 per mille each of iodide and bromide of magnesium, with a fair amount of carbonic acid gas. Some importance has been attached to the lithium and iodine of this water in the treatment of chronic gout, rheumatism, and the uric acid diathesis. The 'Tempel-Brunnen' is rather more highly mineralised but contains less lithium. The Kinder-Brunnen and the Schwefel-Brunnen contain much less solids, and the latter contains about 6 per mille volumes of sulphuretted hydrogen. The springs are all cold.

The gaseous muriated sulphated water of the neighbouring village of GROSSENLUEDER (containing, according to Reichardt, 15·4 per mille common salt, 1·3 per mille sulphate of magnesium, 1·6 per mille each of the sulphate and carbonate of calcium, and ·04 per mille carbonate of iron) is employed for its laxative action.

Kiedrich (Prussian Province of Hesse-Nassau), near Eltville, on the Rhine, at the foot of the Taunus Mountains, has a sanatorium, and the 'Kiedricher Sprudel'—a muriated spring—which, with 6·7 per mille common salt, according to Bischoff's analysis, contains ·5 of potassium chloride, ·75 of calcium chloride, and ·06 of lithium chloride. Some importance has been claimed for the lithium chloride in this water.

Schmalkalden (Prussian Province of Hesse-Nassau) lies at an altitude of 970 feet, on the south-western declivity of the Thuringian Forest, and is the terminus of a branch of the 'Werra' railway from Wernshausen. The earthy muriated water (temperature 63° F.) contains, according to Koebrich, 9·4 per mille common salt and 2·5 per mille sulphate of calcium. The walks in the neighbouring woods might be used for a 'Terrain-Cur.'

Aachen, or **Aix-la-Chapelle**, in Rhenish Prussia.—This spa has for convenience been described under 'Sulphurous Waters' (Chapter XIV.), but might equally well have been classified as having thermal muriated waters.

Münster-am-Stein (Rhenish Prussia) is situated at an altitude of 380 feet, about one and a half mile further up the Nahe valley than Kreuznach. The waters are similar but warmer (temperature of the Haupt-Brunnen, 87·8° F.), and it will be unnecessary to add anything to what has been already said under 'Kreuznach' (*q.v.*). Accommodation is good, though arrangements are somewhat simpler than at Kreuznach.

Pyrmont (Germany, Principality of Waldeck-Pyrmont) possesses muriated waters with 7 to 32 per mille common salt. (See under the Chalybeate Waters, Chapter XII.)

Arnstadt (Thuringia, Principality of Schwarzburg-Sondershausen) is a summer resort in a sheltered locality at the northern border of the Thuringian Forest (altitude 920 feet). It possesses strong muriated (26½ per cent.) waters, used for brine baths (Soolbäder), and the 'Riedquelle,' a weak muriated spring (3·8 per mille common salt) used for drinking.

The affections treated here include rickets and scrofula, various pelvic complaints in women, &c. The season lasts from April to the end of September.

Frankenhausen (Thuringia, Principality of Scharz-

burg-Rudolstadt) lies at an altitude of 370 feet, on the southern declivity of the Kyffhäuser, a little over nine miles from the railway station of Artern. It possesses a cold 25 per cent. brine used for baths and a much weaker muriated water, the Elisabeth-Brunnen, which can be used for drinking. There is an establishment for the treatment of scrofulous children.

Koestritz, in the Principality of Reuss (altitude about 550 feet), is pleasantly situated in the Elsterthal, and is a station on the railway. The brine used for its 'Soolbäder' contains 22 per cent. common salt. Hot sand baths are employed at Koestritz.

Salzhausen (Grand Duchy of Hesse) is situated at an altitude of 470 feet, at the southern foot of the Vogelsberg, one and a quarter mile from the railway station of Nidda. Of its weak muriated waters the strongest has about 1 per cent. of common salt, 1 per mille chloride of magnesium, and a moderate amount of free carbonic acid gas. The water is used for drinking; for bathing a concentrated water is used, if necessary, strengthened by 'Mutterlauge' from Kreuznach or Nauheim. There are likewise a sulphur spring and a chalybeate one.

Salzuflen, or **Salzufflen** (Principality of Lippe-Detmold), a station on the railway between Herford and Detmold, possesses a muriated water containing 4 to 9 per cent. common salt. There are 'Gradirhäuser' in the neighbourhood.

Salzungen (Germany, Duchy of Saxe-Meiningen) lies in the beautiful Werrathal, at the south-western declivity of the Thuringian Forest, about 780 feet above the sea-level. Its muriated waters vary in strength from 3 to 25 per cent. The baths are ordinarily made with a 3 to 6 per cent. muriated water, but they can be strengthened by the addition of Salzungen 'Mutterlauge,' which contains out of a total of 55 per cent. solids about 47 per cent. chloride of magnesium, 2·5 per mille bromide of magnesium, and 1·3 per mille iodide of magnesium. Douches, moor-baths, &c. can likewise be

employed, and there are arrangements for inhalation treatment. The railway station is on the line between Eisenach and Meiningen. (Season, May 15 to end of September.)

Sulza (Thuringia, Grand Duchy of Saxe-Weimar) possesses muriated springs, having a total mineralisation of 5·3 to 14·5 per cent., and containing small quantities of iodine, bromine, and iron. The place, consisting of town, village, and salt works, lies between Weimar and Naumburg, on the Ilm, at an elevation of 480 feet.

Niederbronn (Germany, Alsace), the chief Alsatian spa (altitude 620 feet), is situated at the eastern declivity of the Vosges Mountains, on the railway from Hagenau to Saargemünd. Its principal muriated spring contains about 3 per mille common salt, ·6 per mille chloride of calcium, and ·01 per mille bicarbonate of iron (temperature 64° F.). The waters are chiefly used for drinking in cases of dyspepsia and catarrh of the bowels. In former centuries they were used for prolonged baths.

Rothenfelde is a 'Soolbad' in Hanover, situated at an elevation of 360 feet on the southern slope of the Osning-Gebirge. The muriated water contains a total of 67 per mille solids, 56 per mille being common salt, the rest consisting of chloride of magnesium, bicarbonate of calcium, &c. A concentrated brine, a 'Mutterlauge,' and a dried 'Mutterlauge,' and a weaker muriated water for drinking (14·5 per mille common salt) are likewise made use of. The 'Mutterlauge' contains 12·6 per mille bromide of magnesium. The railway station is on the line between Brackwede and Osnabrück.

Juliushall and **Harzburg** (Duchy of Brunswick, altitude 850 feet) lie close under the Burgberg at the entrance of the Radauthal. The cold muriated springs (there are two of them) contain between 6 and 7 per cent. common salt.

These two places are much visited by the inhabitants of Northern Germany as summer health resorts, on account of their beautiful situation and the numerous

excursions to be made from them in the Harz Mountains, to which they are adjacent.

Kolberg, or **Colberg** (Pomerania), on the Baltic Sea, has, besides its sea baths, muriated waters containing 2·1 to 5·1 per cent. common salt, ·6 to 1·8 per mille chloride of magnesium, and 1·5 to 4·4 per mille chloride of calcium. There are sanatoria for the treatment of scrofulous children, &c.

Inowrazlaw (Prussia, Province of Posen) is a railway station at one hour's distance from Bromberg. According to an analysis of 1875 its 'Bassinsoole' contains 30·6 per cent. common salt, and may therefore be compared in concentration to the brines of Droitwich and Rheinfelden.

Wittekind (Prussian Province of Saxony, altitude 200 feet) is situated one and a quarter mile from the University town of Halle, on the Saale. It possesses a muriated water (3½ per cent.) which is mixed with aërated water for drinking, and can be strengthened with 'Mutterlauge,' or bath salt, for bathing. The bath salt thus employed contains 239 per mille chloride of calcium, and 14·7 per mille bromides.

Elmen, or **Alten Salza,** in the Prussian Province of Saxony (altitude 150 feet), is situated near Gross Salza, on the railway, forty minutes distant from Magdeburg. It is one of the oldest brine baths in Germany, and possesses, amongst other springs, the 'Victoria-Quelle' (26 per mille common salt), used for drinking, and a spring used for bathing, containing about 5 per cent. common salt and ·6 per mille bromide of magnesium.

Koesen (Prussian Province of Saxony), a 'Soolbad' in the Saale Valley, at an altitude of 370 feet, near Naumburg, possesses a 5 per cent. brine (temperature 65·5° F.), and a sanatorium for scrofulous children from Berlin.

Neu-Ragoczi, or **Bad Ragoczi** (Prussian Province of Saxony), named after the famous spring in Kissingen, is one hour from the railway station of Halle-on-the-

Saale, and possesses muriated springs (up to 1 per cent. of common salt), containing a little iron and much nitrogen gas. The waters are used for drinking and bathing, and the nitrogen is employed for inhalation purposes.

Thale (altitude 740 feet), in the Prussian Province of Saxony, lies under the Rosstrappe, at the entrance to the beautiful Bodethal, in the Lower Harz Mountains. The neighbouring HUBERTUSBAD, on an island in the Bode, is supplied by the 'Hubertusbrunnen' with a muriated water containing 14·3 per mille common salt and 10·7 per mille chloride of calcium. The railway station of Thale is terminus of a line from Quedlinburg.

Dürrheim (Grand Duchy of Baden), in the Black Forest, at an altitude of 2,300 feet, half an hour's drive from the railway station of Marbach, possesses a 26 per cent. brine, used for bathing. The place is a summer resort, and can boast of a sanatorium, the 'Amélie-Bad,' for scrofulous children, &c.

Canstatt (Cannstatt) and **Berg**, near Stuttgart, Würtemberg.—These towns adjoin each other, and are connected by a tramway with Stuttgart, of which town they practically form the north-eastern suburb. There are several springs, the most used of which are the Wilhelmsbrunnen at the 'Kursaal,' and the Sprudel and Inselquelle, situated between Berg and Canstatt on a small island of the Neckar. The springs yield tepid earthy muriated waters (about 2 per mille common salt and 1 per mille carbonate of calcium), fairly rich in carbonic acid gas, which can be used for drinking and bathing in catarrhal affections of the digestive and respiratory organs.

The mild sheltered climate is of great assistance in some cases, but, unfortunately for its usefulness as a spa, Canstatt is more and more assuming the character of the manufacturing suburb of an important town.

For drinking purposes the laxative action of the waters may be increased, if desirable, by the addition of

Karlsbad salt, &c. and for bathing purposes the waters may be heated to a suitable temperature. The season lasts from the beginning of May to the middle of October.

Hall, in Würtemberg (Schwäbisch Hall), is a picturesque place, situated at an altitude of about 980 feet. It possesses a muriated water (23 per mille common salt) which by the addition of a more concentrated brine, or of 'Mutterlauge,' may be used for 'Soolbäder' of different strengths. There is also a weak sulphur spring. The season lasts from May 1 to October 1.

Jaxtfeld, or **Jagstfeld**, in Würtemberg (altitude 450 feet), lies at the junction of the Jagst with the Neckar, 6 miles from the railway station of Heilbronn. It possesses a 26 per cent. brine used for bathing, and an establishment (Bethesda) for weak children.

Dürkheim (altitude 380 feet), in Rhenish Bavaria, lies at the entrance to the Isenach valley, on the western foot of the Hardt Mountains. Its muriated waters, which are mainly used for bathing, contain $\frac{3}{4}$ to 2 per cent. of common salt. The mineral waters of Dürkheim have the historical interest that in them the rarer metals, cæsium and rubidium, were first discovered, though, of course, only in traces.

Berchtesgaden, in Upper Bavaria, near the Austrian border, is a summer health resort, in a sheltered position on the southern slope of the Untersberg, having an altitude of about 1,890 feet, and possessing a $26\frac{1}{2}$ per cent. brine. The surplus of the Berchtesgaden brine is conducted by pipes to Reichenhall, which in its turn supplies Rosenheim and Traunstein with a mixture of its own and Berchtesgaden brines.

Both the climate and brine baths of Berchtesgaden can be of service in the treatment of rachitic and scrofulous conditions. Owing chiefly to its position, the place is used in the treatment of chronic affections of the respiratory organs, or for a rest after a course of waters at Karlsbad, Marienbad, &c. Berchtesgaden is very beautiful, and the pleasant and popular excursions

in the neighbourhood (the Königssee, the salt mines, &c.) bring it a number of ordinary holiday guests and tourists, as well as patients requiring its climate or baths. It is too much shut in by mountains to be called bracing. The season is from the middle of May to the middle of October. Berchtesgaden is one hour distant by the local railway from Reichenhall. There is likewise direct communication with Salzburg, partly by omnibus, partly by a local steam-tram line.

Reichenhall, in the Bavarian Alps, close to the Austrian frontier, is situated in the fairly broad valley of the Saalach at an elevation of 1,570 feet above the sea. On the east, south and west the valley is shut in by mountains; towards the north-east, in the direction of Freilassing, it is open. The winds from the north and north-east are, however, of infrequent occurrence. The mean summer temperature is about 62·8° F. The surrounding country is beautiful and the climate may be called fairly bracing.

Of the numerous salt springs at Reichenhall the Edelquelle (about 22 per cent. of common salt) and the Karl-Theodorquelle are the most important; their waters are mixed together for baths, which may be strengthened by the addition of Reichenhall 'Mutterlauge,' rich in chloride of magnesium. For internal use the water is diluted. At the 'Trinkhalle' whey and the best known waters of other spas can be obtained in the morning. A laxative 'bitter water' has, moreover, been artificially prepared from the 'Mutterlauge.' For inhalation purposes there are the 'Gradirwerke' (in the Kurgarten), with the spray from a neighbouring brine fountain, and inhalation rooms where the finely pulverized water may be inhaled. There are chambers for the inhalation of compressed air in emphysematous and chronic bronchitic conditions. There are also excellent arrangements for artificial gaseous baths in imitation of the natural baths of chalybeate spas and the Thermal-Soolbäder of Nauheim.

Chronic catarrhal conditions of the respiratory organs are amongst the cases most frequently treated at Reichenhall. Various conditions of general debility are likewise suited. Walks have been arranged and carefully mapped out for a 'Terrain-Cur' after Oertel's views in fatty infiltration of the heart, &c. The season lasts from the middle of May to the end of September.

Besides its own brines Reichenhall receives the surplus of the Berchtesgaden brine, and a mixture of these brines is conducted by pipes to Rosenheim and Traunstein.

Access : Viâ Munich and Freilassing, four hours from Munich. Reichenhall is connected by a branch-line with Freilassing, a station on the railway between Munich and Salzburg.

Accommodation : Good.

Doctors : G. von Liebig, Cornet, Rapp, A. Schmid, Bulling, &c.

Rosenheim (altitude 1,640 feet), in Upper Bavaria, is situated on the plain to the north of the Bavarian Mountains, at the junction of the Mangfall with the Inn. It has brine baths, supplied with a 24 per cent. brine from Reichenhall (*i.e.* a mixture of the Reichenhall and Berchtesgaden brines). There is also a weak chalybeate spring. Rosenheim is a railway junction on the line between Munich and Salzburg.

Aibling (altitude 1,575 feet) is a pleasant place in Upper Bavaria, with a railway station six miles to the west of Rosenheim, which supplies the brine for its baths. The moor-baths, for which Aibling is chiefly known, are made up with brine and 'Mutterlauge,' and are employed for the results of old pelvic imflammation, old articular troubles, scrofulous affections, &c. There are likewise two weak chalybeate springs.

Traunstein (Upper Bavaria), altitude 1,960 feet, pleasantly situated on the slopes above the Traun, is a station on the railway between Munich and Salzburg. It has brine baths supplied with brine from Reichenhall

(a mixture of the Reichenhall and Berchtesgaden brines). There are pleasant shady walks in the neighbourhood.

Kreuth (Bavaria) possesses brine baths supplied from a distance; but it is doubtless the climate, due to its position in the Bavarian Mountains 2,700 feet above the sea, which gives the place its chief value in the treatment of scrofula, convalescence, anæmia, &c. Kreuth lies in a sheltered position amidst beautiful woodland mountain scenery, between the Tegernsee and the Achensee, 2½ hours distant from the railway station of Gmund-am-Tegernsee. The Kreuzquelle, a cold weakly mineralised earthy spring, containing a little sulphuretted hydrogen, is used for drinking and bathing. The season is June 1 to September 15.

Heilbrunn, in the Bavarian Mountains, is a village situated at an altitude of 2,620 feet, 1½ hour distant from the railway station at Tölz. At Heilbrunn is the Adelheidsquelle, a cold muriated spring, containing, according to E. Egger (1881), 4·9 per mille common salt, ·9 per mille bicarbonate of sodium, ·05 per mille bromide of sodium, and ·03 per mille iodide of sodium. Of German muriated waters this is the richest in bromine and iodine; but it is doubtful whether these substances are present in sufficient amount to exercise any decided therapeutic effect.

Amongst German muriated waters, containing under 15 per mille common salt, the following have not yet been mentioned:—

Sulzbrunn, in Upper Bavaria, near the village of Sulzberg, at an altitude of 2,800 feet [the Römerquelle, according to Liebig, contains about 2 per mille common salt and ·015 iodide of magnesium]; Sodenthal, or Soden in the Spessart, in Northern Bavaria (the waters have 9·4 to 13·8 per mille common salt and a small amount of bromide and iodide of magnesium); Neuhaus in Bavaria, at the foot of the Salzburg, in the valley of the Saale (9 to 15 per mille common salt); Sulzbad (French, Soultz-les-Bains) and Kestenholz (French,

Châtenois) in Alsace (3·2 per mille common salt in their waters); Gandersheim, in the Duchy of Brunswick (springs contain up to 13·7 per mille common salt); Werl, in Westphalia; and Königsdorff-Jastrzemb, in Prussian Silesia (11 per mille common salt, with a little bromide and iodide of magnesium).

Other German 'Soolbäder,' with brines of various strengths (above 15 per mille common salt), are:—Admiralsgarten-Bad and other springs in Berlin; Oldesloe and Segeberg in Holstein; Salzdetfurth in Hanover; Cammin and Greifswald in Pomerania; Orb and Soden-Stolzenberg in the Prussian Province of Hesse-Nassau; Suderode, Artern, and Dürrenberg in Prussian Saxony; Goczalkowitz in Prussian Silesia; Wimpfen on the Neckar in Hesse-Darmstadt.

Ischl, in Austria (Salzkammergut), a station on the railway between Gmunden and Aussee, lies in a broad fertile valley at the junction of the Traun and the Ischl, about 1,500 feet above sea level. Some of the houses on the surrounding slopes have a fresher air than the principal part of the town, which is built in a lower position on the banks of the Traun, almost completely sheltered on every side by mountains.

The strong Ischl brine, containing $23\frac{1}{2}$ per cent. common salt, with a total of $24\frac{1}{2}$ per cent. solids, is used for baths. The 'Schwefelquelle' contains, in addition to 17 per mille common salt, 4 per mille sulphate of sodium and a little sulphuretted hydrogen. The Klebelsberg-Quelle and the Marie-Louisen-Quelle, containing about 5 per mille common salt, are used for drinking, and the most important mineral waters of other spas can be obtained at the 'Trinkhalle.' The indications for a course at Ischl are the ordinary ones for muriated waters and strong brine baths.

Moor baths ('Salz-Schwefelschlammbäder'), pine baths, and hydrotherapeutic treatment can be obtained. Ischl is likewise, on account of its numerous admirably laid out walks in the shady pine forests and surrounding

slopes, well adapted for treatment by graduated walking exercise, the so-called 'Terrain-Cur.'

Owing to the beauty of the surroundings and good accommodation many persons visit Ischl more as a place of recreation and climatic health resort than on account of the waters. In many cases Ischl is suitable for an after-cure to active mineral water treatment. Milk and whey cures can also be arranged. The spa is much visited by Austrians. The season is from June to September, but accommodation can be obtained earlier and later.

Doctors: M. Mayer, H. Hertzka, &c.

Gmunden, in Austria, the chief town of the Salzkammergut, lies at an altitude of 1,370 feet, on the beautiful Traun See, and is a station on the railway between Attnang and Ischl. A 24 per cent. brine from the Ebensee salt-works is used at Gmunden for bathing. There is apparatus for artificial aëro-therapeutic treatment. Season, June to the end of September.

Doctors: Wolfsgruber, Galasch, &c.

Aussee, a very popular summer health resort in Styria, close to the Salzkammergut, is pleasantly situated at an altitude of 2,150 feet, in a broad fertile valley, sheltered on all sides by the surrounding mountains. It possesses a 25 per cent. brine, used for bathing. Both the brine and the 'Mutterlauge' are employed in a diluted form internally. The railway station is twenty minutes distant. The season is May 15 to October 1, but there is likewise accommodation to be had during winter.

Doctors: Veth, Engelhardt (in Alt-Aussee), &c.

Hall in the Tyrol (Austria), seven miles east of Innsbruck, is an old-fashioned town, situated in the lower Inn valley, at an altitude of 1,700 feet. It is a station on the Munich and Innsbruck railway, and is likewise connected with Innsbruck by a local steam tram line. The baths in the neighbourhood are supplied with a 24 per cent. brine, conducted from the Salzberg,

about six miles distant. In the neighbouring village of Heiligenkreuz are a chalybeate spring and a weak sulphur spring. The season is from May 15 to September 30.

Hallein (altitude 1,450 feet), an Austrian summer health resort on the left bank of the Salzach, eleven miles south of Salzburg, has noted brines and arrangements for brine baths. The station is on the railway running south from Salzburg.

Hall in Upper Austria.—Bad Hall (altitude 1,060 feet) is a station on the branch line of the Kremsthal. It is celebrated for the muriated water of the Tassilloquelle, which according to E. von Ludwig (1893) contains 12 per mille chloride of sodium, with ·081 per mille bromide of magnesium and ·028 per mille iodide of magnesium. This water, which is exported as the 'Haller Iodwasser,' was anciently known as the 'Haller Kropfwasser.' The exact therapeutic value of the iodide and bromide in the water remains doubtful. There are likewise other salt springs. This spa is used for scrofulous and rickety children, for the treatment of syphilis, and for some gynæcological affections. There is a hospital for scrofulous children founded in 1855, a small sanatorium for poor adults, and a military sanatorium. The season is from May 15 to September 30. The bath salt extracted from the water contains 14·3 per mille chloride of calcium, 2·6 per mille iodide of magnesium, and 3·2 bromide of magnesium.

Doctors: Dr. Rabl, Dr. Koerbl, &c.

Hercules-Bad, near MEHADIA, in Hungary. The 'Hercules spring' yields an unusually large quantity of thermal muriated water (temperature variable, 70° to 133° F.), free from sulphuretted hydrogen; but most of the springs are sulphurous (see Chapter XIV.).

Csiz, in Upper Hungary, in the Rima valley, three-quarters of a mile from the railway station. According to the analysis of Professor E. Ludwig, of Vienna, in 1890, the Hygieaquelle, the only one used for drinking, is a

cold muriated water containing 18 per mille common salt, ·14 per mille bromide of magnesium, and ·04 per mille iodide of magnesium. In the *Bäder Almanach* it calls itself the 'strongest iodine spring of the Continent.'

Also-Sebes (Hungary, in the Carpathian mountains, not far from Galicia) possesses muriated springs, which are used for drinking and bathing; the richest in common salt is the Ferdinands-Quelle (12·4 per mille). The Amalien-Quelle contains some bicarbonate of iron. The arrangements of the spa are inadequate. It is 1½ mile from the railway station of Eperies.

Ivonicz or **Ivonitch** (Galicia) in the Carpathians, at an altitude of 1,340 feet, possesses two gaseous muriated springs, the Karls-Quelle and the Amalien-Quelle (about 8 per mille common salt), which contain a little sodium carbonate (about 1·7 per mille) with iodide of sodium (about ·016 per mille); the first spring contains ·023 per mille bromide of sodium. There are likewise chalybeate and naphtha springs, the last of which is used for inhalation. Peat and mud baths are employed. The railway station is 7½ miles from the establishment.

Salzburg, one of the most visited spas in Transylvania (altitude 1,590 feet), possesses brines of different strengths (from 5 to 15 per cent.), containing from 0·8 to ·25 per mille iodide of sodium.

Baassen (altitude 630 feet), picturesquely situated in Transylvania, 8 miles from the railway station of Mediasch, possesses muriated springs (temperature 54°–59° F.), containing minute quantities of iodide and bromide of sodium, and rich in carbonic acid gas. The Felsen-Quelle contains 4 per cent. common salt, ·03 per mille bromide of sodium, and ·013 per mille iodide of sodium.

Rheinfelden (Switzerland) is an ancient town pleasantly situated (altitude, 866 feet) in Canton Aargau. It lies on the left bank of the Rhine, nine miles above Basel, in the broad part of the Rhine valley, bounded by

the Black Forest on the north, and the Jura Mountains on the south. The climate is mild and in summer rather warm, but the neighbouring forests and the stream impart freshness to it.

Rheinfelden, like Droitwich in England, possesses one of the strongest possible brines. According to the analysis of Professor Bolley its brine ('Soole') contains 31 per cent. common salt, with 5 per mille gypsum; the specific gravity taken at 57° F. is 1·205. The Rheinfelden brine is therefore practically a saturated solution of common salt. The 'Mutterlauge' contains 31 per cent. common salt, with about 3 per mille chloride of magnesium and 2 per mille chloride of calcium, and therefore differs from the original 'Soole' much less than the 'Mutterlaugen' obtained from weaker muriated waters do.

The Rheinfelden treatment consists chiefly in brine baths and douches, and Dr. Keller and others have shown that concentrated brine can in a large number of cases be used for this purpose without producing excessive irritation. Hydrotherapeutics and massage are likewise made use of when required. Sometimes local applications by a towel wrung out of the 'Soole' or 'Mutterlauge' are ordered, and occasionally the brine is taken internally in a very diluted form.

The baths are suitable in many anæmic and cachectic conditions, which require stimulating treatment, in scrofulous children and in patients of the pasty lymphatic type. According to A. Robin of Paris and Keller of Rheinfelden, brine baths are suitable in those cases of chlorosis, where an examination of the metabolism shows that the processes of oxidation in the body are incomplete and that the nitrogenous materials are not sufficiently made use of. Rheinfelden may be of service likewise in cases of prolonged convalescence, in cases where there are remains of old pleuritic inflammation, and in many chronic rheumatic affections. The season is from May to the end of October.

Access: Rheinfelden is a station on the railway between Basel and Zurich; express trains as well as ordinary trains stop there.

Accommodation: Excellent; in the town itself or preferably on the river side above the town. There is likewise an excellently managed hospital for poor patients, situated close to a forest where the patients can remain most of the time in the open air.

Doctors: Keller, &c.

Schweizerhalle (Switzerland) in the Canton of Basel, situated on the left bank of the Rhine, at an elevation of 900 feet above the sea, is about 20 minutes' drive from the railway station of Pratteln. Its strong brine is practically saturated like that of Rheinfelden.

The interesting old towns of Saeckingen and Laufenburg on the Rhine (the former on the right or German bank), between Rheinfelden and Waldshut, also possess 'Soolbäder.'

Bex (Switzerland, Canton Vaud) is a climatic health resort situated at an altitude of about 1,400 feet on the right side of the broad Rhone Valley, eleven miles from the eastern end of the lake of Geneva. The position is almost completely sheltered by mountains, and commands a magnificent view of the Dent du Midi, which towers above the opposite side of the valley. The cold brine of Bex according to Brunner's analysis (1894) contains 27 per cent. common salt, 2 per cent. chloride of calcium, with about 1 per cent. chloride of magnesium; the total solids is 31 per cent. The Eau-Mère (total solids, 33 per cent.) contains according to Brunner 25 per cent. common salt, 4 per cent. chloride of magnesium, and about 2 per cent. chloride of potassium; it is often used for baths in combination with the brine, and after filtration and dilution is sometimes used internally at Bex, as well as at the neighbouring spa of Lavey. The cold muriated sulphur spring is not much used. There are arrangements for hydrotherapeutics and massage. Bex is a good locality for grape-cures, and milk or whey cures can be arranged.

The patients most treated here are delicate women, requiring tonic treatment, scrofulous children, patients with a tendency to pulmonary catarrhs, &c. The daily fluctuations in temperature are somewhat greater than those at Montreux and other localities on the lake of Geneva, but it is very hot in summer. The season lasts from March to the end of October; the best months are May and June, and from the end of August to the end of September.

Access: Bex has a station on the railway from Lausanne to Brieg.

Accommodation: Good. The Hotel des Salines is in a park away from the town.

Doctors: De la Harpe, H. Hunerwadel, &c.

Wildegg (Switzerland, Canton Aargau) is pleasantly situated in the valley of the Aar, about two and a half miles to the south of the spa of Schinznach (Chapter XIV.). Its cold muriated water (10 per mille common salt, 1·6 per mille chloride of magnesium, 1·8 per mille sulphate of calcium) contains iodide of sodium (·028 per mille) and bromide of sodium (·013 per mille). This water is employed at the neighbouring spa of Schinznach in scrofulous affections, &c. and is exported.

Châtel-Guyon (France, Department of Puy-de-Dôme) lies in a pleasant part of the Auvergne, at an altitude of 1,300 feet. The spa is situated to the west of the old town, at the entrance of the valley of the Sardon stream, and is fairly well sheltered from the north-west wind. There are two bath establishments and arrangements for hydrotherapeutic treatment.

Its alkaline earthy muriated waters, rich in carbonic acid gas (temperatures 75° to 98·6° F.), contain a considerable quantity of iron, and, owing to the presence of chloride of magnesium, exert a slightly laxative action. Following are the chief chemical constituents of the 'Source Gubler' (temperature 89·6°) according to the analysis made in 1878 by Dr. Magnier de la Source:— Bicarbonate of calcium, 2·1 per mille; bicarbonate of

sodium, ·95; bicarbonate of iron, ·06; bicarbonate of lithium, ·019; chloride of magnesium, 1·5; chloride of sodium, 1·6. The Source Gubler is very rich in carbonic acid gas and is the only one of the springs used for exportation. In its chemical constitution it may be regarded as the type of the Châtel-Guyon springs.

Owing to the combination of the chlorides with the iron in the waters and their laxative character, the spa has been sometimes called the French Kissingen, and is more conveniently classed amongst the muriated than amongst the alkaline muriated group. The class of cases treated at Châtel-Guyon includes atonic dyspeptic and chronic catarrhal conditions of the digestive organs, especially those associated with 'abdominal plethora' and chronic constipation. According to Dr. Baraduc, in cases of chronic constipation the laxative effect is often not evident at once; in such cases it frequently shows itself after the course of waters is over, but lasts longer than the same effect does when brought about by a stronger saline purgative treatment. Dr. Baraduc recommends Châtel-Guyon in that obstinate chronic affection of the intestines known as chronic membranous enteritis, 'mucous disease,' or 'entérite mucomembraneuse.' The season lasts from May 15 to October 15.

Access: The distance from the railway station of Riom is about 3½ miles (50 minutes by omnibus).

Accommodation: Now satisfactory.

Doctors: Baraduc, &c.

Bourbon L'Archambault (France, Department of Allier).—This spa was once very famous, owing to the residence of Madame de Montespan and the visits of Catherine de' Medici, the Princes de Condé, Madame de Sévigné, Madame de Maintenon, Racine, Boileau, &c. and, in later times, Prince Talleyrand. The town (altitude 870 feet), dominated by the picturesque ruins of its ancient castle, is situated on hilly ground about sixteen miles to the west of Moulins.

The thermal muriated water (temperature 126° F.),

of which there is an abundant supply, according to Willm's analysis, has a total mineralisation of 3·1 per mille, including 1·7 per mille common salt, ·4 per mille carbonate of sodium, ·2 per mille carbonate of calcium, and a minute amount of iron. According to the earlier analysis of Ossian Henry the amount of common salt was 2·2 per mille. The thermal water is used at the temperature required, for drinking, baths, douches, and swimming baths.

The 'Source Jonas' is a cold, weakly mineralised, slightly chalybeate spring (total mineralisation according to Willm is 1·49 per mille), and is said to have a certain laxative and diuretic action. It is sometimes taken pure or mixed with wine at meal times. A more agreeable table water, much used at this spa, is the gaseous weak alkaline earthy Source Saint-Pardoux (bottled at the spring nine miles distant) containing a small amount of iron. According to Willm its total mineralisation is only ·15 per mille. The spring of La Trollière, not far from that of Saint-Pardoux, is also sometimes made use of. Its water is similar to that of the latter spring, but contains a variable quantity of sulphuretted hydrogen, an ingredient not present in the water of Saint-Pardoux.

Bourbon-l'Archambault has a fine, newly erected thermal establishment; it likewise possesses two hospitals, one for persons unable to pay, the other for patients sent by the military authorities. The affections treated here include various forms of chronic rheumatism and nervous affections. This spa has a certain old reputation for benefits obtained in cases of paralysis due to cerebral hæmorrhage, but fewer cases are sent here now that the pathology of these conditions is better understood. According however to Dr. Regnault the thermal treatment does no harm in such cases, and may often do some good. Dr. Regnault mentions good results obtained in cases of arthritis deformans of rapid onset in young persons. As adjuvants to the thermal treatment, massage and a sort of dry cupping are often employed. For the

dry cupping instead of ordinary cupping glasses, small horns are employed with a hole pierced at their ends. Special attendants apply them to the skin, suck out the air, and then close the hole with wax. Douches are sometimes applied as at Bourbon-Lancy under the water of the bath.

The season is May 15 to September 15.

Access: The railway station is on the line from Moulins to Cosne-sur-l'Œil, one hour from Moulins.

Accommodation: Satisfactory.

Doctors: P. Regnault, &c.

Bourbon-Lancy (France, Department of Saône-et-Loire).—The spa (altitude 780 feet) lies in a shallow valley to the west of and under the old town, about 31 miles to the east of Moulins. It was known to the Romans and became famous through the visit in 1542 of Queen Catherine de' Medici.

Its thermal muriated springs (temperature 82·4°–136·4° F.) are all weakly mineralised, approaching the indifferent thermal group in character. According to the analyses of Tellier and Laporte in 1858 and of F. Glénard in 1881 the different springs resemble each other in their chemical constituents. The Source de la Reine, which may be taken as a type of the Bourbon-Lancy waters, has according to Glénard a total mineralisation of 1·82 per mille, and contains 1·29 per mille common salt. The waters can therefore hardly be compared, as they have been compared, to the Wiesbaden waters, which contain about 7 per mille common salt. One of the Bourbon-Lancy springs has a slight smell of sulphuretted hydrogen.

The thermal establishment is provided with baths, douches, apparatus for pulverisation, hot vapour chambers, and a swimming bath. The douches are sometimes applied to the affected part beneath the water of the bath (the 'submarine douche' as de Bosia terms it).

The affections treated at Bourbon-Lancy include chronic rheumatism, chronic nervous disorders, and,

according to Dr. de Bosia, some chronic valvular and other cardiac complaints. Poor persons receive thermal treatment gratuitously at the Hospice d'Aligre.

The 'Source de la Reine,' bottled after the addition of carbonic acid gas, is sometimes used here as a table water.

The season is May 15 to September 15.

Access: The railway station is on the line between Gilly and Cercy-la-Tour, and about $1\frac{3}{4}$ mile distant from the spa.

Accommodation: Good. Patients, if they prefer it, can lodge in rooms at the thermal establishment itself.

Doctors: H. de Bosia, Pain, Favre, Goëde.

Bourbonne-les-Bains (France, Department of Haute-Marne).—Bourbonne is a small town, pleasantly situated (altitude, about 900 feet) on hilly ground belonging to the Monts Faucilles, a small chain connected with the Vosges Mountains. Owing to its position in relation to mountains and forests it has a good deal of rain for this part of France.

The thermal waters have a temperature of 109° to 150° F., and according to the analysis (1881) of Willm and Würtz they contain 5·2 per mille common salt, 1·3 per mille sulphate of calcium, 0·08 per mille chloride of lithium, 0·06 per mille bromide of sodium, and minute quantities of iron and manganese. Unlike the waters of Wiesbaden they are practically non-gaseous.

The waters are employed both internally and externally. Two or three glasses of a quarter litre form the average daily dose for adult patients, and are taken either hot or cold.

Externally the water is chiefly employed for hot baths and douches. The douches (5–10 minutes) are generally given whilst the patient reclines; the pressure is considerable, so that a mechanical effect is produced, although manual massage is not applied together with the douche, as at Aix-les-Bains. The douches are employed in chronic rheumatoid arthritis, sciatica,

neuralgias, &c. and are specially directed to the affected parts of the body. Similar treatment is employed for the various results of old injuries to bones and joints. Massage is given separately if required.

Besides rheumatoid arthritis, scrofulous conditions in children, and chronic affections of the pelvic organs in women, are much treated at Bourbonne. The thermal baths have also, like those of Barèges, an old reputation for the healing of wounds and chronic ulcers. In addition to the civil baths there is a most excellent establishment for thermal treatment attached to the military hospital. The season is from May to the middle of October.

In the neighbourhood are two cold weakly mineralised earthy springs, the Source Bayard (Larivière-sous-Aigremont) and the Source Maynard. Both have a total solids of about 2·6 per mille, and are non-gaseous: the former contains a little iron. They are used as table waters or otherwise at Bourbonne, and are supposed to have a special action analogous to that of Contrexéville waters in urinary affections.

Access: Bourbonne-les-Bains is the terminus of a small branch railway from Vitrey, a station on the railway between Chaumont and Vesoul.

Accommodation: Good.

Doctors: Prudon, &c.

La-Mouillère-Besançon (France, Department of Doubs).—La Mouillère (altitude 830 feet), a suburb of Besançon, possesses a new bath establishment, founded in 1892, supplied by an underground conduit with the very strong brine from Miserey, a station on the railway 3½ miles from Besançon. According to the analysis of Boisson and E. Baudin, the brine contains 283 per mille of common salt, 4 per mille calcium chloride, 2·4 magnesium chloride, 6·7 sodium sulphate, 0·1 bromide of potassium and traces of iodides (total mineralisation 298 per mille). The 'eau-mère' contains 234 per mille common salt, together with 73 per mille of other chlorides,

12 per mille sodium sulphate, and 2·2 per mille bromide of potassium. The water and eau-mère are employed for external use. There are likewise arrangements for ordinary hydrotherapeutic and electrotherapeutic treatment, and for artificial sulphur baths and muriated sulphur baths ('artificial Uriage baths'). A new first-class hotel and a casino adjoin the establishment.

Doctors: Baudin, &c.

Salins (France, Department of Jura).—Salins (altitude 1,200 feet) is a town picturesquely situated on the stream Furieuse, in the midst of the Jura Mountains. Lofty fort-crowned hills rise above the town on either side. It possesses cold muriated waters containing, according to Réveil, 22 per mille common salt, ·03 per mille bromide of potassium, and traces of iodide of sodium. The waters are chiefly used for baths and douches; when used for drinking they are diluted and sweetened with a syrup. The baths are sometimes strengthened with the 'eau-mère,' which contains, according to Réveil, 16 per cent. common salt, 6 per cent. chloride of magnesium, 8 per cent. sulphates of sodium and potassium, and 2·8 per mille bromide of potassium. There are small brine swimming baths suitable for children. Salins is a spa for scrofulous and rickety children, convalescents, women with leucorrhœa, &c. It is the terminus of a branch line from Mouchard on the railway from Dijon to Pontarlier. The establishment and hotel connected with it (which adjoin some interesting ancient salt-works or *salines*) are open from June to October. In the neighbourhood are numbers of pleasant excursions, especially suitable for those who can walk uphill.

Doctors: F. Guyenot, &c.

Lons-le-Saunier (France, Department of Jura) is a town of moderate size, pleasantly situated at an altitude of about 840 feet in a broad hilly valley on the outskirts of the Jura Mountains. The railway station is on the line between Besançon and Lyons. At one end of the

town is a recently-erected bath establishment, with brine baths, hydrotherapeutic appliances and small swimming baths of salt water. The brine, obtained from the Salines of Perrigny, is one of the strongest, after those of Droitwich and Rheinfelden; it has 305 per mille common salt, with a total mineralisation of 319 per mille. The 'eau-mère,' with a total mineralisation of 370 per mille, contains 6·9 per mille bromides. There is likewise a chalybeate muriated water, obtained from a spring called the Puits-Salé; it is suitable for drinking, and contains 10 per mille common salt, 1·1 chloride of magnesium, 1·6 carbonate of magnesium, 0·09 carbonate of iron, with a moderate amount of carbonic acid gas, and a trace of sulphuretted hydrogen.

Salins-Moutiers (France, Savoy).—This spa has been, for convenience, described with its neighbour Brides-les-Bains in Chapter XI. (See under BRIDES-SALINS.)

Uriage (France, Department of Isère) is described in the sulphurous group (see Chapter XIV.).

La-Motte-les-Bains (France, Isère) is situated in a pleasant Dauphiné valley at an elevation of about 2,000 feet above sea-level. The railway station, which is a little higher than the establishment, is 23 miles from Grenoble on the line to La Mure. The two very hot muriated springs (124° and 137·5° F.) rise a short distance from the baths; they contain about 3 per mille common salt, about 1·3 per mille sulphate of calcium, and 0·02 per mille bromide of sodium.

The waters are used internally and externally. Their chief use is in the form of baths and douches for chronic and painful rheumatic affections, sciatica and neuralgias, and in various chronic affections of the female pelvic organs. The thermal establishment, which is likewise an hotel (an old château transformed), is open from June to September.

Salies-de-Béarn (France, Department of Basses-Pyrénées) has a railway station one quarter of an hour

from Puyoo, a junction of the railway between Toulouse and Bayonne, 33 miles east of Bayonne. Its 'Fontaine Bayaa,' according to O. Henry, contains rather more common salt than the brine of Nantwich in England, that is, about 21 per cent., but a more recent analysis gives it 25½ per cent. The 'Source Oraas' is said to contain as much as 30 per cent. The 'eau-mère' contains, according to Garrigou, about 22 per cent. common salt, 15 per cent. chloride of magnesium, 5 per cent. chloride of potassium, and one per cent. of bromides.

Salies-de-Béarn (altitude 100 feet) has a mild climate, very hot in summer, and is open the whole year. Its waters can be used for the affections usually treated by brine baths.

Accommodation: Satisfactory.

Doctors: Marcadé, &c.

Biarritz (Department Basses-Pyrénées), the fashionable marine spa and winter resort on the south-western coast of France, now possesses baths supplied by the muriated springs of Briscous, which contain about 29 per cent. common salt. The 'eau-mère' is likewise employed for baths, and is especially rich in chloride of magnesium. The water is heated to the temperature required for baths and douches. The bath establishment is about ten minutes' walk from Biarritz, on the steam tramcar line between Biarritz and Bayonne, and is connected by a covered gallery with the large new hotel on the opposite side of the road.

Dax (France, Landes) is supplied with brine and 'eau-mère,' similar in composition to those of Briscous. The spa has already been described in Chapter VI.

Salies-du-Salat (France, Haute-Garonne) lies at an altitude of 960 feet, on the left bank of the Salat stream. The village has a railway station on the branch line between Boussens and Saint-Girons. The cold muriated water contains 30 per mille common salt and 3 per mille sulphate of calcium. There is likewise a cold sulphurous spring, containing, according to Filhol, ·11

per mille sulphide of calcium. A sanatorium is devoted to children sent from the hospital of Toulouse.

Balaruc (France, Hérault) stands at about sea-level, on the salt Étang de Thau, which separates it on the south from the Mediterranean port of Cette. It possesses three common salt springs, whose temperatures are respectively 54°, 66°, and 118° F. The 'Source des Romains,' or 'Source Ancienne,' is the hottest, and contains about 7 per mille chloride of sodium. The waters are used for drinking, and for baths and douches, in scrofulous and rheumatic affections. The 'eau-mère' of Villeroy is sometimes added to strengthen the action of the baths. Local mud baths are also used. Balaruc has an old reputation in torpid nervous affections; but comparatively few organic nervous diseases are now sent thither for spa treatment. The spa is reached from Cette by train (6 miles), by steamer, or by road.

Roucas-Blanc (France, Bouches-du-Rhône).—This establishment is on the coast, two miles to the east of the harbour of Marseilles, and possesses a muriated spring (temperature 70° F.) containing 20 per mille common salt, 2 per mille chloride of magnesium, and about 2 per mille of the sulphates of sodium, magnesium and calcium. It is connected by the Corniche tram-line with Marseilles.

Amongst other French muriated waters, containing under 15 per mille common salt, are the following: L'Échaillon in Department Savoie (thermal 3·6 per mille); Plan-de-phazy in Department Hautes Alpes (4·6 per mille); Pouillon in Department Landes, six miles from Dax (10 per mille).

Abano, North Italy (Province of Venice).—Abano (altitude 100 feet), a few miles by rail from Padua, lies in the region of the Euganean hills. The water of the thermal springs (temperature 100° to 183° F.), according to R. Nasini's analysis of 1894, contains 3·4 per mille common salt and about 1 per mille sulphate of calcium, and so little sulphuretted hydrogen that they can hardly

be classified amongst the sulphur waters. Protococcus and other primitive forms of plant life grow in the water. The springs were well known as the Aquæ Aponenses or Aquæ Patavinæ in Roman times, and in the sixth century Theodoric the Great ordered the baths to be restored.

Besides thermal mineral water baths, a mud ('fango'), rich in organic material and impregnated with the salts of the mineral waters, is employed, as at Acqui and Battaglia, in the form of hot local applications. Amongst the affections treated are rheumatoid arthritis, chronic rheumatic and gouty troubles and neuroses. The waters can be obtained also in Venice. The season is June 1 to September 30. Abano possesses a mild winter climate.

The neighbouring 'Euganean thermæ,' Montegroto, San-Pietro-Montagnone and Monte Ortone, have very hot waters, similar to those of Abano, but slightly less mineralised. The waters of Battaglia, the least mineralised of the group, have been classified in the simple thermal group (Chapter VI.).

Salsomaggiore (Province of Parma) is about 5 English miles (36 minutes by steam tramway) from Borgo-San-Donnino, a station on the railway between Piacenza and Parma. It is pleasantly situated, 520 feet above sea-level, at the foot of the Apennines, and there are interesting excursions to be made in the neighbourhood.[1]

Its cold muriated water, according to A. Gibertini's analysis of 1871, contains 131 per mille common salt, 13 per mille chloride of calcium, 4·9 per mille chloride of magnesium, ·2 per mille bromide of magnesium, ·06 per mille iodide of magnesium, and 3·7 per mille of a bituminous material. The Mutterlauge (Italian, 'Acqua Madre') chiefly contains chloride of calcium (176 per mille) and chloride of magnesium (80 per

[1] See 'Salsomaggiore: its Waters and Baths,' by J. Harold and P. A. E. Richards. *Brit. Med. Journ.*, 1898, vol. i. p. 443.

mille), with the remaining, not precipitated, portion (44 per mille) of common salt. A ferruginous spring, near the baths, is said to contain ·05 per mille carbonate of iron.

Monte Catini, in Italy (Province of Lucca).—The spa (altitude 920 feet) is prettily situated in the Val di Nievole. It possesses several thermal muriated springs (temperatures 70° to 88° F.), containing 4 to 18 per mille common salt. The waters are employed internally and externally for dyspeptic conditions, scrofula, chronic rheumatism, &c. The season is from May 1 to September 30.

Castro Caro, in Italy (Province of Toscana), one hour's drive from the railway station of Forli, possesses muriated waters containing iodides and bromides. According to Professor L. Guerri, the water of the 'Sorgente Magnani' contains 44 per mille common salt, ·197 per mille iodide of magnesium, and ·185 per mille bromide of magnesium. The accommodation is comfortable.

Castellamare, Pozzuoli and **Ischia** are classed amongst the muriated-alkaline group (Chapter IX.).

Caldas-de-Montbuy, in Spain (Province of Barcelona), possesses thermal muriated springs (temperature 122° to 158° F.) of great local repute for rheumatism, sciatica, and old wounds. The spa is a two hours' drive from the railway station of Mollet, and is resorted to before and after the hottest season of the year.

Cestona-Guesalaga, in the North of Spain (Province of Guipuzcoa), owns thermal weak muriated waters (95° F.), containing a little sulphate of calcium and sulphate of sodium.

Caldas-de-Malavella, in Spain (Province of Girone), possesses thermal muriated waters (temperature 145° F.), containing a total of only about 1 per mille solids (chiefly chlorides of calcium and magnesium). In fact, they might be likewise classed in the simple thermal group.

Ciechocinek, in Russian Poland, two miles from the

Prussian border, possesses muriated waters (18 to 44 per mille common salt) and 'Gradirhäuser,' which can be used for inhalation.

Russia is rich in brines of various strengths, thanks to the salt lakes, 'limans' as they are called in Russian, which occur in considerable numbers near Odessa and in the Crimea, and along the whole northern shore of the Black Sea.

CHAPTER VIII

SIMPLE ALKALINE WATERS

Simple alkaline waters (see p. 33) are often of use for dyspepsia in fairly robust persons, especially when there is catarrh of the stomach and intestines. Prolonged courses of simple alkaline waters may, however, be harmful in catarrhal conditions of the digestive organs in weak people when the gastric secretion is deficient in acidity, and in the ordinary 'atonic dyspepsia' of anæmics, chlorotics and slow convalescents. Though emaciation is by no means a necessary result of the use of simple alkaline waters, one of the muriated alkaline group is preferable when loss of weight has specially to be avoided.

Simple alkaline waters exert a diuretic influence, and the alkali probably aids the action of water in increasing the other secretions of the body. They are useful in at least some cases of gout, and gouty glycosuria, and the uric acid diathesis; in tendency to gallstones and 'abdominal plethora.' In respect to their effect on hepatic functions Mayo Robson[1] found that an aërated alkaline water increased the flow of bile more than several reputed cholagogues which he tried in the same case of biliary fistula; other experimenters, however, give various different results. Their action in cases of obesity has been ascribed to the alkali combining with fat in the body to form soluble soaps, which are then excreted. This theory has not been confirmed, and the action of alkaline waters in obesity and glycosuria is probably

[1] *Proceedings of the Royal Soc., London*, vol. xlvii. p. 505.

largely, if not wholly, due to the accompanying regulation of the diet.

Alkaline baths have a more cleansing action on the skin than plain water baths of the same temperature; when much carbonic acid gas is present, they may exercise a mechanically stimulating action, similar to that of baths of other gaseous waters. Warm alkaline baths, like most warm baths, are often useful in catarrhal conditions of the female pelvic organs.

Amongst the simple alkaline waters those of Vichy and Vals will be placed first as well-known types. The rest will be given afterwards in the political geographical order previously made use of.

Vichy (France, Department Allier).—Vichy, one of the most frequented spas of France, is situated (altitude 736 feet) on the right bank of the River Allier amidst a rather flat cultivated country of somewhat uniform aspect. Its fame as a fashionable spa dates from about the time when Madame de Sévigné (1678) came to undergo the treatment and wrote such amusing letters about it.

The thermal alkaline waters of Vichy may be regarded as the representatives of the simple alkaline class. The different mineral springs of Vichy differ from each other chiefly in their temperature, in the proportion of free carbonic acid gas, and in the fact that some of them contain a mentionable amount of iron. Arseniate of sodium is found in traces (·002 per mille in the 'Source Grande Grille').

The 'Grande Grille,' the best known of the Vichy springs, has a temperature of 108·5° F., and contains 4·8 per mille bicarbonate of sodium. The 'Source de l'Hôpital' has a temperature of only 89° F., and contains rather more carbonic acid gas and bicarbonate of sodium (5 per mille). The three 'Sources des Célestines' are all cold; the 'Source ancienne' contains about the same amount of carbonic acid gas and bicarbonate of sodium as the 'Hôpital' spring just mentioned, whereas the

'Source nouvelle' and the 'Source de la Grotte' are characterised by containing respectively ·044 and ·028 per mille of bicarbonate of iron. The spring of 'Mesdames,' which is conducted from its source (near Cusset about two miles distant) to the Établissement des Bains at Vichy, resembles the two foregoing springs, and contains ·026 per mille bicarbonate of iron. Amongst the other springs at Vichy the 'Puits Chomel' should certainly be mentioned; it is very similar in temperature and constituents to the 'Grande Grille,' but is less rich in carbonic acid, and slightly richer in bicarbonate of sodium.

The patients treated at Vichy are mainly dyspeptics, and persons suffering from gall-stones, the uric acid diathesis, and various gouty, hepatic, urinary, and female pelvic disorders. Sufferers from chronic rheumatism likewise often resort to this spa. All patients should have a certain amount of reserve strength, those with considerable cachexia of any kind being unsuited to Vichy treatment, a point especially to be considered in the case of gouty and diabetic patients.

The waters of Vichy taken in suitable doses have, as a rule, no laxative action like the sulphated alkaline waters of Marienbad, &c. but they are nevertheless used in the treatment of obesity; in such cases of course the diet is most important, but it has been supposed that the alkaline constituents of the Vichy water form soluble soaps with the fats of the body, and thus favour their removal by excretion; this theory concerning the alkaline treatment of obesity is, however, doubtful.

In anæmic conditions the 'Source Mesdames' is the one generally preferred. The hot 'Grande Grille' has a special reputation in biliary calculi and hepatic complaints, the more strongly alkaline 'Source de l'Hôpital' being often preferred for gastric complaints, and the colder and more diuretic water of the 'Source ancienne des Célestins' for urinary affections. In recent times, however, the view of this sharp therapeutic division in

the uses of the different springs has been considered somewhat arbitrary, and the doctors do not always act according to it. The 'Puits Chomel' was until lately mainly reserved for gargling, &c. in cases of chronic pharyngitis and respiratory affections, but its use has been lately extended to cases formerly treated by one of the other hot springs of Vichy.

The Vichy waters are mostly taken at first in small doses such as half a glass twice daily, and afterwards the dose is gradually increased to four or five glasses in the day; in former years much larger doses were given. The time preferred for taking the waters is about two hours after meals or an hour before; the more chalybeate Vichy waters ('Source Mesdames,' &c.) are often ordered to be drunk at meal times.

Baths are very much used at Vichy, in addition to the internal use of the waters. The large 'Établissement des Bains' provides thermal mineral water baths, vapour baths, douches, and inhalation rooms. Besides the large establishment (first and second classes) there is a smaller one near the 'Source de l'Hôpital.' Quite recently, in addition to other hydrotherapeutic treatment, massage with douching after the method of Aix-les-Bains has been introduced at Vichy.

The mineral water of Vichy is likewise employed for perinæal, vaginal, and rectal douches. In specially severe gastric cases the stomach is periodically washed out by the ordinary syphon method.

There are several alkaline mineral springs in the neighbourhood of Vichy, amongst which the various springs of Saint-Yorre, about five miles to the south of Vichy, may be specially mentioned; they are strong, cold alkaline springs, belong to private owners, and their waters are used almost exclusively for exportation.

Near Cusset, two miles only from Vichy, with which it is connected by electric tram, arises the 'Source Mesdames,' as already mentioned, the waters of which are conducted to Vichy. The place has likewise two cold alkaline springs

of its own: the 'Source Sainte Marie' (4·2 per mille bicarbonate of sodium) somewhat resembling the 'Mesdames,' but containing more iron and a little lithium, and the 'Source Elisabeth,' containing 5·8 per mille bicarbonate of sodium. Cusset is further away from the river than Vichy, and the country around is somewhat more picturesque; it possesses a hydrotherapeutic establishment.

The alkaline waters of Vichy and its neighbourhood are largely exported, and can be well used at home. The colder springs are better adapted for this purpose than the hot springs; those of Saint-Yorre, Hauterive, and Célestins may be specially mentioned.

The Vichy season lasts from May 15 to the end of September, but the baths remain open all the year. For most invalids the middle of summer is unpleasantly hot at Vichy. On the subject of 'after-cures' the reader is referred to Chapter XXI.

Access: In about 18 hours, *viâ* Paris.

Accommodation: Very good.

Doctors: Durand-Fardel, senior and junior, Cornillon, Willemin, Audhoui, Déléage, Glénard, Cormack, Jardet, &c.

Vals, in France (Department of Ardèche).—Vals is picturesquely situated at an altitude of 790 feet in a valley running from south to north. The spa lies on the banks of the Volane stream close to its junction with the Ardèche. Trees have been planted, and there is already a fair amount of shade around the sources, for the patients to walk in. Pleasant excursions can be made in the district.

Vals has been called the 'Cold Vichy,' and is celebrated for its great number of cold alkaline springs, which are rich in carbonic acid gas, and contain from less than 1 to as much as 7 per mille bicarbonate of sodium, and small quantities of the bicarbonates of lithium, iron, &c. The different sources may be arranged in a series according to the degree of their

alkalinity. Thus the more weakly mineralised of them, such as the Pauline, Délicieuse No. 1, Saint-Jean, and Impératrice, which have a total mineralisation of less than 3 per mille (not more than 1·7 per mille of bicarbonate of sodium), can be used as agreeable table waters. The Souveraine and Chloe springs have a higher mineralisation, that of the former being 3 per mille (2·5 per mille bicarbonate of sodium), that of the latter, 5·2 per mille (3·2 per mille bicarbonate of sodium). The 'Précieuse,' 'Désirée,' 'Rigolette,' 'Marquise,' and 'Magdeleine' springs are much more strongly alkaline, containing about 6·5 to 7·3 per mille bicarbonate of sodium with a total mineralisation of 7·5 to 8·9 per mille.

The 'Source Souveraine' contains ·042 per mille bicarbonate of lithium. Some of the springs (as the 'Rigolette') contain a considerable quantity of bicarbonate of iron. The 'Vivaraise' spring No. 1, which has ·05 per mille of the bicarbonates of iron and manganesium, contains only 2 per mille of the bicarbonate of sodium.

The number of the alkaline springs at Vals is very great, and as at Saint-Yorre, near Vichy, a cold alkaline water can be obtained everywhere by sinking a well to a certain depth.

In the treatment of dyspepsia and cases of gastric catarrh, &c. springs of different strength must be selected to suit the patient. The Rigolette water is artificially warmed at the source for the benefit of patients in whose case a thermal alkaline water, like those of Vichy, is desired.

The Établissement Thermal is well provided with apparatus for baths and douches. Skilled massage may be obtained when advisable. There is an apparatus for supplying local douches of carbonic acid gas collected from the mineral water. These gas douches are used in some chronic catarrhal conditions of the nose and pharynx; in some cases of vaginismus without obvious cause or associated with chronic inflammation of the

cervix uteri, local gas douches are likewise said to be of service.

The sources 'Précieuse,' 'Magdeleine,' 'Rigolette,' and 'St. Jean,' are those most frequently employed for use in England.

Besides its alkaline waters, Vals likewise possesses weak sulphate of iron and arsenical springs (see Chapter XIII.).

The season is from May 15 to October 15.

Access: By Paris, Lyons, Le Teil and Vogué, in about 16 or 18 hours from Paris. The railway station (Vals-les-Bains and La Béguda) is on the branch line from Vogué to Nieigles-Prades, three miles beyond Aubenas.

The *accommodation*, which was unsatisfactory in former times when the waters were almost solely exported, is now sufficient.

Doctors: Chabannes, A. Lagarde, Ollier, &c.

Neuenahr, Germany (Rhenish Prussia).—This comparatively recent spa is much resorted to. It lies in a sheltered position in the valley on both banks of the Ahr, at an altitude of about 760 feet. In the middle of summer the heat is very great, and there are not the wooded walks in the neighbourhood which might be wished for. The waters are the only thermal simple alkaline waters in Germany; they are, however, much weaker than the similar waters of Vichy. The supply is abundant, amply sufficient for drinking purposes and for use in the large, recently erected bath-house. The big 'Sprudel' (temperature 96° F.), according to R. Fresenius and E. Hintz (1894), contains ·6 per mille carbonate of sodium, ·2 per mille carbonate of calcium, ·3 per mille carbonate of magnesium, ·012 carbonate of iron, minute quantities of arsenic and other substances, and a considerable quantity of free carbonic acid gas.

There is a room where patients with catarrhal conditions of the respiratory system may inhale the finely pulverised water as at Ems; a few cases of quiescent

early chronic phthisis come here during the season, but the beneficial effect is doubtful. Cases of chronic nephritis, dyspepsia with hyperacidity, and functional troubles of the nervous system (especially when allied with slight glycosuria), are treated here. The chief reputation of the spa is, however, in the treatment of troubles connected with the uric acid diathesis, and in cases of glycosuria. It hardly need be added that typical cases of diabetes in young persons are not likely to be cured here, or even to derive any permanent benefit from the treatment; the cases of so-called diabetes most likely to derive benefit being chronic cases in elderly persons, without wasting, especially when allied to gout or the uric acid diathesis. The season lasts from May to the commencement of October. Close to Neuenahr are the Apollinaris-Brunnen (mentioned in the chapter on 'Table Waters') and other springs of the same class.

Access: By Cologne and Remagen in about 18 hours; Neuenahr is a station on the railway between Remagen and Altenahr.

Accommodation: Good.

Doctors: Unschuld, Grube, Lenné, Niessen, and Teschemacher.

Birresborn (Rhenish Prussia), a village with a railway station on the line from Cologne to Treves, has an alkaline gaseous spring with 2·8 per mille bicarbonate of sodium. Together with the bicarbonate of sodium it contains a little bicarbonate of magnesium and sulphate of sodium, which impart a slight laxative effect, sometimes useful in acid dyspepsia with habitual constipation. It is often used as a table water.

Fachingen, in Prussia (Province of Hesse-Nassau), on the Lahn, between Ems and Limburg, possesses an alkaline spring rich in carbonic acid gas, and of about the same strength as the water of Bilin in Bohemia. Fachingen water contains, according to Fresenius, about 3·5 per mille bicarbonate of sodium. If used, therefore, as a 'table water,' it must not be expected to mix well

with wine. The spring is the property of the Prussian State, and the water is only used for exportation.

Obersalzbrunn (**Salzbrunn**) in Prussian Silesia, situated on the Salzbach at an altitude of 1,320 feet, is a station on the railway from Breslau to Halbstadt. Of its cold alkaline springs the chief one 'Oberbrunnen' contains, according to R. Fresenius (1882), 2·15 per mille bicarbonate of sodium, ·01 bicarbonate of lithium, ·4 per mille sulphate of sodium, and 985 per mille volumes of free carbonic acid gas. The 'Mühlbrunnen' and other springs contain less bicarbonate of sodium. The 'Kronenquelle,' a spring in private hands, used for exportation, contains only ·87 per mille bicarbonate of sodium, ·01 bicarbonate of lithium, ·7 per mille bicarbonate of calcium, and ·18 per mille sulphate of sodium; the 'Wilhelmsquelle' is equally weak. The whey cure is made use of at this spa, as at so many others. Season May 1 to September 30.

Doctors: Nitsche, Pohl, Determeyer, Montag.

Radein (altitude 660 feet) in Styria possesses cold gaseous alkaline waters, which are exported as well as taken at the place itself. According to the 1894 analysis by A. F. Reibenschuh, they contain 3 per mille carbonate of sodium, 0·3 carbonate of lithium, and ·01 carbonate of iron.

Gabernigg in Styria, 2½ hours from Rohitsch, possesses several gaseous alkaline waters, some of which are exported.

Bilin in Bohemia, near Teplitz, possesses the 'Biliner Sauerbrunn,' a cold gaseous alkaline spring, which, according to Huppert's analysis of 1875, contains 3·3 per mille carbonate of sodium, and ·7 per mille sulphate of sodium. The water is used for chronic gastric catarrh, gouty complaints, uric acid gravel, and chronic bronchial catarrh. In some persons Bilin water acts as a gentle laxative, perhaps owing to the minute quantity of sulphate of sodium it contains. In gouty cases the cure may be commenced or continued at the neighbouring

Teplitz. The water may be drunk pure or mixed with whey. The bath establishment possesses arrangements for hydrotherapeutic treatment. The season lasts from May 15 to the end of September.

Szinye-Lipocz, near **Eperies**, in Hungary, possesses the 'Salvator' spring, the water of which is exported. It is a weakly mineralised cold gaseous alkaline water containing, according to Prof. M. Ballo (1882), ·3 per mille bicarbonate of sodium, ·9 per mille bicarbonate of magnesium, 1·7 per mille bicarbonate of calcium, ·09 per mille borate of sodium, and 0·2 per mille bicarbonate of lithium. It has been recommended in the treatment of the uric acid diathesis, and in some urinary affections, &c.

The **Fellathalquellen** in Carinthia (altitude 1,970 feet), about five hours distant from the railway station of Kühnsdorf, are gaseous alkaline springs, the waters of which, containing 4·3 per mille bicarbonate of sodium and 1·7 per mille bicarbonate of calcium, are exported.

Preblau (Carinthia) is pleasantly situated in the Lavant valley 3,280 feet above sea-level. Its cold gaseous alkaline waters, containing 2·2 per mille bicarbonate of sodium, are used at the place itself, and are likewise exported as table waters.

Al-Gyogy, a village in Transylvania, possesses three weak alkaline springs, having a temperature of about 86° F. They are used in chronic catarrhs, skin affections, chronic rheumatism, and gout.

Passugg (Switzerland) in the Grisons. The establishment, about one hour distant to the south-east of Chur, lies at an altitude of 2,710 feet on the projecting eminence between the Rabiusa and the Plessur streams, just before their junction. Its cold gaseous alkaline springs contain, according to Planta, 1·9 to 5·6 per mille bicarbonate of sodium, ·6 to 1 bicarbonate of calcium, and ·01 bicarbonate of iron. Of these the comparatively weakly mineralised Theophilquelle, with a total solids of 3·9 per mille, might be used in some cases as a table

water, whereas the Ulricusquelle contains more bicarbonate of sodium than the 'Grande Grille' at Vichy, and has, according to Planta, a total solids of 8·4 per mille. The cold gaseous alkaline-earthy chalybeate 'Belvedra' spring contains, according to Husemann, 2 per mille bicarbonate of calcium, and ·03 per mille bicarbonate of iron. The climate of Passugg must aid considerably in the treatment of anæmia and some kinds of dyspepsia. The season is from June to September.

Le Boulòu, in France (Pyrénées-Orientales) is a village on the Tech river, at an altitude of 275 feet, about one mile from the railway station of Le Boulou-Perthus. It possesses simple alkaline waters rich in free carbonic acid gas (temperature 59°–68° F.). The waters, which are chiefly sent out for use at home, are employed in dyspeptic conditions, &c. where simple alkaline waters are indicated. According to Willm (1883), the 'Source du Boulou' contains 3 per mille bicarbonate of sodium, 1·4 per mille bicarbonate of calcium, and ·02 per mille bicarbonate of iron; the 'Source Clémentine' contains 5 per mille bicarbonate of sodium, ·8 per mille bicarbonate of calcium, and ·03 per mille bicarbonate of iron.

Le Boulou is termed by Garrigou the 'Vichy of the Pyrenees.'

Châteauneuf in France (Department of Puy-de-Dôme) lies at an altitude of 1,750 feet, on the River Sioule, in a deep valley about 18 miles from Riom. It possesses weak alkaline waters having temperatures varying from 54° to 100·5° F. Some of the colder springs, notably the 'Source Morny,' contain a considerable amount of iron (·05 per mille of the bicarbonate in the 'Source Morny').

Some of the warm springs are used for baths like simple thermal waters. The chalybeate 'Source Morny' is exported. Châteauneuf may be reached by diligence in about four hours from the railway station of Riom, or in about three hours from that of Saint-Éloy.

Amongst other French simple alkaline waters the following may be mentioned: Andabre in Dép. Aveyron (see under Sylvanès); Artonne in Dép. Puy-de-Dôme (a gaseous water containing, according to Parmentier, 2·4 per mille bicarbonate of sodium and 0·9 per mille bicarbonate of calcium); Désaignes in Dép. Ardèche (3 to 4·1 per mille bicarbonate of sodium); Marcols in the same Department (2·4 to 2·6 per mille bicarbonate of sodium); and Montrond in Dép. Loire, with the Source Geyser (containing 4·5 per mille bicarbonate of sodium). Pougues-les-Eaux has been classified in the earthy group (see Chapter XV.).

San Marco in Central Italy, three miles from Castiglione-della-Pescaja, has a gaseous alkaline water, which is exported with or without additional carbonic acid gas. According to A. Nannini Tanucci, 1884, it contains 1·3 per mille bicarbonate of sodium, 1·6 per mille bicarbonate of magnesium, and 0·26 per mille bicarbonate of lithium (total solids = 5·3 per mille).

Palermo, in Sicily, possesses the 'Acqua Santa,' a cold muriated spring.

Vidago, in the north of Portugal, has alkaline waters used in similar cases to those in which the Vichy waters are employed. According to the analysis of Professor Lourenço, the Vidago spring contains 4·6 per mille bicarbonate of sodium, ·9 calcium bicarbonate, ·03 lithium bicarbonate, and ·01 bicarbonate of iron, together with a fair amount of free carbonic acid gas. The taste is not at all unpleasant, and the water is exported in bottles. The other springs at Vidago are less highly mineralised. The season is from the beginning of June to the end of September.

Borjom (Russia, Tiflis), not far from Abbas-Tuman in the Caucasus, has, on account of its simple alkaline waters, obtained the name of the 'Russian Vichy.' According to the analysis given by Dr. F. G. Clemow, the Catherine spring (total solids 6·3 per mille) contains 5·0 per mille bicarbonate of sodium and ·01 bicarbonate of iron; its temperature is 84° F.

CHAPTER IX

MURIATED ALKALINE WATERS

These waters are employed in the same class of cases as the simple alkaline waters, especially when loss of flesh is to be avoided. The common salt lessens the tendency of the sodium bicarbonate to render the urine too alkaline, and makes up for the increased amount of sodium chloride excreted in the urine when the alkaline salt is being taken. This class of waters is not so likely to produce the depressing effects which the simple alkaline waters occasionally do. It may be mentioned also that common salt by itself is said by some to be of therapeutic use in the tendency to formation of uric acid calculi and gravel, owing perhaps to an inhibitory action on the precipitation of uric acid.

In some cases the use of the bicarbonate by itself, either in the form of an ordinary medicine or in mineral waters, may produce an attack of acute gout, whereas when given together with common salt it is less likely to do so. The observations of Mordhorst on this subject ('Lancet,' July 17, 1897), should they be confirmed, strongly support the use of muriated alkaline waters in cases of chronic gout and rheumatism. Sir W. Roberts,[1] however, holds that in cases of real gout all unnecessary ingestion of sodium salts should be avoided, because these salts favour the precipitation of biurates of sodium

[1] "Croonian Lectures on the Chemistry and Therapeutics of Uric Acid Gravel and Gout," London, 1892; also Article in Allbutt's *System of Medicine*, vol. iii., 1897.

in the body, and may thus increase the gouty troubles, and produce exacerbations of articular gout.

The muriated alkaline waters are useful in cases of chronic catarrh of the respiratory organs, and in these cases the climate of the spa is of great importance.

In anæmic and cachectic cases the iron (*e.g.* at Royat, &c.) and arsenic (*e.g.* La Bourboule, Royat, &c.) may partly explain the action of some of these waters.

In describing the spas belonging to this group Ems and Royat will be placed as types first, and the rest in political geographical order will be arranged to follow them.

Ems, Germany (Prussia, formerly Duchy of Nassau). —Ems (altitude 300 ft.) is beautifully situated in the narrow valley of the Lahn on both sides of the river. It consists of a mass of hotels, villas, bath-houses, with a magnificent Kursaal, &c.; these show to what an extent the place is made use of as a health resort and for pleasure. The mild climate (too hot for many in the middle of summer) contributes doubtless to the use of this spa in laryngeal and bronchial catarrhs.

There are in use nine different thermal muriated alkaline springs, of temperatures varying from 80° to 120° F.; they contain, according to R. Fresenius, about 2 per mille bicarbonate of sodium, with 1 per mille common salt, and over 500 volumes per mille carbonic acid gas; six of the springs are used for drinking; there is likewise a chalybeate spring (temperature 70° F.) containing ·02 per mille carbonate of iron.

The baths are nicely fitted up, and furnished with apparatus for hot and cold douches; massage may be had in suitable cases. Besides the baths there are rooms for gargling and for inhaling the finely pulverised water, simple or medicated with Peruvian balsam, oil of pine, &c. These can be used in the treatment of patients with catarrhal conditions of the larynx and bronchi. Bronchitis in gouty persons is especially treated at Ems. In cases of pulmonary emphysema an apparatus is

frequently used for expiration into rarefied air and inspiration from air of increased density, after the method of Waldenburg. Dr. Geissé considers the employment of such an apparatus to afford a capital pulmonary exercise when used methodically once or twice a day for fifteen minutes. Compressed air chambers can also be made use of.

The waters of Ems are also used in catarrhal and gouty dyspepsia with hyperacidity, in cystitis, and in various gouty conditions, especially in thin or weak persons, where the simple alkaline waters, as of Vichy and Neuenahr, and the sulphated alkaline waters, as of Marienbad and Karlsbad, are considered too lowering. Good results are claimed in some cases of chronic albuminuria.

The baths are employed in cases of leucorrhœa, catarrhal conditions of the uterus and cervix uteri, and in nervous cases of dysmenorrhœa. In some cases a vaginal douche is employed whilst the patient is in the bath. Ems has an old reputation in cases of sterility, as the name of one of its springs, the 'Bubenquelle,' calls to mind.

During hot weather the shady walks on the hill sides are very agreeable for those who are able to take them. A funicular railway has recently been constructed up the Malberg on the south of the town, and patients may thus quickly reach the refreshing air of the woods on the summit, which is about 1,000 feet above the town.

Access: By train in 16 to 19 hours *viâ* Cologne, Coblenz, and Niederlahnstein.

Accommodation: Very good.

Doctors: Geissé senior and junior, Döring, Vogler, Panthel, &c.

Royat, France (Department of Puy-de-Dôme).—Royat is situated in the Auvergne Mountains on the lower slopes of the Puy-de-Dôme, at an altitude of 1,480 feet. Its position at the entrance of the Tiretaine valley is most beautiful. The hotels and villas which constitute the spa stand chiefly on the right side of the stream;

towards the east they overlook the city of Clermont-Ferrand (about $1\frac{1}{4}$ mile distant), and the broad fertile plain of the Limagne, watered by the Allier river, on the opposite side of which are the outlines of the Forez hills; towards the west the old town of Royat stretches up the valley in the direction of the summit of the Puy-de-Dôme. The lesser heights towards the north and north-west afford protection against excessive winds.

On account of its thermal muriated alkaline springs Royat has been called the French Ems, but the Royat waters are likewise decidedly ferruginous, containing ·02 to ·056 per mille of the bicarbonate of iron.

The four springs are the Grande Source or Source Eugénie, the Source César, the Source Saint-Mart, and the Source Saint-Victor. The temperatures are 68° F. to 95° F. The Source Eugénie, which is the warmest and most highly mineralised (total mineralisation is 5·6 per mille), contains 1·7 per mille common salt, 1·3 per mille bicarbonate of sodium, 1·9 per mille bicarbonate of calcium, ·04 per mille bicarbonate of iron, ·035 chloride of lithium, and a trace of arsenic. Of the other three springs the Saint-Victor has the lowest temperature and contains the most iron (·056 per mille of the bicarbonate) with ·004 per mille of the arseniate of sodium; the Saint-Mart has the greatest amount of carbonic acid gas; and the César is the least mineralised (2·8 per mille). There are likewise bituminous waters, but these are not made use of at present.

The chief bath-house of Royat is well arranged; the small one (César) has very limited accommodation. Close by the modern establishment are extensive remains of the Roman thermæ, excavated in 1882.

The Royat waters are employed for drinking, for baths, swimming baths and douches, for sprays and inhalation. The carbonic acid so plentifully supplied by the springs is sometimes used in the form of gas baths (Chapter III.), more often for local douches, especially to the vagina. By means of a special arrangement an

ordinary mineral water bath can be supercharged with carbonic acid gas, the gas being introduced from the carbonic acid reservoir by numerous perforations in a pipe coiled round the bottom of the bath. A high degree of effervescence is thus produced, probably as much as in any Nauheim bath or in any gaseous 'iron bath.'

The affections treated at this spa include rheumatoid arthritis, gout and the uric acid diathesis, atonic dyspepsia, chronic laryngitis, and bronchitis. Chronic skin eruptions (eczema, psoriasis, urticaria) and gynæcological affections may be benefited, especially when occurring in arthritic subjects. When anæmia forms a complication, the Source Saint-Victor, on account of the iron and arsenic it contains, is generally preferred, whereas the Source Saint-Mart (·035 per mille chloride of lithium) has a special reputation in gouty cases. The Source César, owing to its comparatively weak mineralisation, is the least likely to disturb the digestion. Inhalation treatment is adopted for diseases of the respiratory system. Douches and massage are much employed when the joints are affected.

Saint-Mart is occasionally used as a dietetic drink, and courses of this water are often taken away from the spa. Saint-Victor and César are likewise exported.

The season lasts from May 15 to September 15. There are many beautiful walks and interesting excursions to be made in the neighbourhood.

The waters are drunk in the morning about 7 or 8 o'clock, and often again in the afternoon about 4 o'clock. Sometimes a sirup is added to the water. The baths, douches, &c. can be taken in the morning or afternoon. The general French method is to get through the morning bathing and drinking on an empty stomach and take 'déjeuner' at 10.30 or 11 A.M. Many of the English, however, are recommended to take coffee at about 9 o'clock, that is at a convenient time after drinking the waters, and to have their bath later on in the morning, delaying their mid-day meal or lunch till 1 o'clock.

Access: *Viâ* Paris to Clermont-Ferrand; thence by electric tramway, train, or omnibus, to Royat.

Accommodation: Good.

Doctors: Petit, G. H. and J. E. Brandt, Frédet, Chauvet, Puy le Blanc, &c.

Toennistein (Rhenish Prussia) in the Brohl Valley, at an elevation of 420 feet, is an hour's distance from the railway station of Brohl. In the neighbourhood is the 'Heilbrunnen,' a gaseous muriated alkaline spring containing about 2·5 per mille bicarbonate of sodium, 1·6 bicarbonate of magnesium, 1·4 common salt, ·02 bicarbonate of iron, and 1,270 per mille volumes of carbonic acid gas. There are likewise two gaseous alkaline chalybeate springs, the Stahlquelle (Natronlithionquelle) and the Angelikaquelle (total solids, 2·5 to 3 per mille).

Offenbach on the Main, four miles from Frankfurt, has a muriated alkaline water, containing about 2·4 per mille bicarbonate of sodium, 1·2 per mille common salt, and ·019 per mille bicarbonate of lithium.

Assmannshausen, Prussia (Province of Hesse-Nassau).—This summer resort, beautifully situated on the right bank of the Rhine at the foot of the Niederwald, possesses a tepid weakly mineralised muriated alkaline spring (temperature 82·8° F.). The bicarbonate of lithium (·028 per mille out of a total mineralisation of only 1 per mille) in the water has been supposed to exert an especial therapeutic effect in gouty cases. Muscular rheumatism, chronic catarrhal conditions of the intestinal and respiratory organs are also treated here. It seems, however, doubtful whether the effects are not those of simple tepid water, aided by climate, change in mode of living, &c.

Weilbach in the Prussian province of Hesse-Nassau. The 'Natronlithion-Quelle' belongs to the muriated alkaline group, but is noticed with the other Weilbach springs in Chapter XIV., amongst the sulphur waters.

Wildungen in Germany (Principality of Waldeck). This spa is described in the earthy group (Chapter XV.),

but the Helenenquelle and the Königsquelle may likewise be mentioned amongst muriated alkaline waters.

Gleichenberg (Styria), 930 feet above the sea, lies in a pleasant, hilly, and well-wooded country, one and a quarter hour's drive from the railway station of Feldbach, and three hours' from Graz. The place is resorted to for its mild climate and its cold gaseous muriated alkaline waters, especially in cases of chronic (including tuberculous) affections of the respiratory organs and dyspeptic conditions. The chief springs are the Constantin-Quelle (3·6 per mille bicarbonate of sodium, 1·8 common salt, 1,340 per mille volumes of carbonic acid gas), and the less gaseous Emma-Quelle. In the neighbourhood is the gaseous weak chalybeate Klausen-Quelle, sometimes used for anæmic patients and at the end of the treatment. The alkaline chalybeate Johannis-Brunnen, situated at a distance of about one hour and a half, is used on account of its agreeable refreshing taste. Inhalations of the pulverised water and hydrotherapeutic procedures are frequently resorted to as aids in the treatment at Gleichenberg, which enjoys a great reputation throughout the Austro-Hungarian empire and in South Germany.

Season from May to September. The accommodation is satisfactory.

Doctors: C. Clar, Hoenigsberg, &c.

Sanct Lorenz, a station on the Rudolfsbahn in Upper Styria, possesses two gaseous muriated alkaline springs, used for exportation. The Sanct Lorenzquelle, according to R. Goddeffroy's analysis, contains 1 per mille carbonate of sodium, 0·5 per mille carbonate of calcium, 0·07 per mille carbonate of iron, 2·7 per mille common salt, and 0·06 chloride of aluminium. The Fentscherquelle, called Austrian Selters water, is slightly less mineralised (total solids amount to 4 per mille), and contains only 0·03 per mille bicarbonate of iron. Both of these springs, but especially the former, deserve a place likewise in the chalybeate group; the latter could be used as a dietetic drink in many cases.

Luhatschowitz in Moravia, a quarter of an hour's distance from the village of that name, and one and a half hour's drive from the railway station of Ungarisch-Brod, lies in a pleasant valley of the Carpathians, 1,600 feet above sea-level. It possesses cold gaseous muriated alkaline waters, containing iodine and bromine, and is chiefly used for drinking. According to J. Picek (1891) the Vincenz-Quelle and the three other chief springs contain 3·0 to 4·4 per mille carbonate of sodium, 2·4 to 4·5 per mille common salt, ·007 to ·012 per mille iodide of sodium, ·02 to ·045 bromide of sodium, ·37 to ·52 borate of sodium, and much carbonic acid gas. The waters are exported, and can be well used at home. They exercise a checking influence on the tendency to uric acid gravel, and are also useful in catarrhal conditions on a gouty basis. Two or three tumblerfuls can be taken in the 24 hours, but the amount required varies in different cases. The admixture of common salt in these waters lessens the tendency of the sodium bicarbonate to render the urine too alkaline, and to exercise a depressing effect on the constitution. There are many persons in whom the use of sodium bicarbonate by itself has this depressing influence; whilst in the same persons the combination of common salt and sodium bicarbonate is much better borne.

Season, May 15 to the end of September.

Czigelka in Hungary possesses gaseous muriated alkaline waters. The exported water of the Ludwigsquelle contains about 4·6 per mille common salt, 8 per mille bicarbonate of sodium, and ·015 iodide of sodium.

Kovaszna-Vajnafalva, neighbouring villages in Transylvania (altitude 2,800 feet), possess gaseous muriated alkaline waters and carbonic acid gas baths.

Szczawnica in Galicia is situated on the northern declivity of the Carpathians, at an elevation of 1,700 feet above sea-level. It possesses cold muriated alkaline springs rich in carbonic acid gas; of these the Magdalenen-Quelle contains 8·4 per mille bicarbonate of sodium

and 4·6 per mille chloride of sodium. Chronic catarrhal affections of the respiratory organs are suitable for this spa, which possesses also means for inhalation treatment, and for whey and koumis 'cures.' It is a six hours' drive from Alt-Sandeck, the nearest railway station.

Lipik in Slavonia, not far from the railway station of Pakracz, has a sheltered position in a valley, at an elevation of 500 feet. The hottest of its weak muriated alkaline waters (temperature 147° F.) contains 1·9 per mille bicarbonate of sodium, ·6 common salt, ·02 iodide of sodium.

Saint-Nectaire in France (Department of Puy-de-Dôme) lies in a beautiful valley of the Auvergne Mountains, at an altitude of 2,500 feet. There are numerous muriated alkaline springs, with temperatures ranging from 50° to 111° F., and all of them containing iron (about ·01 to ·025 per mille of the bicarbonate), lithium (up to ·095 of the bicarbonate), and small quantities of arseniates (up to ·005 arseniate of sodium).

The 'Source du Mont-Cornadore' contains 2 per mille of both the chloride and the bicarbonate of sodium (temperature 105·8° F.). The cold 'Source Rouge,' so named from its ochreous deposit, contains about ·02 per mille bicarbonate of iron, ·069 per mille bicarbonate of lithium, 2·3 per mille common salt, 2·7 per mille bicarbonate of sodium, traces of arseniates, and a considerable amount of free carbonic acid gas. The cold 'Source des Dames' contains about 2·5 per mille each of common salt and bicarbonate of sodium, ·016 per mille bicarbonate of iron, and arsenic equivalent to ·005 per mille of the arseniate of sodium. The 'Source Boëtte' is the hottest of the springs (111° F.).

The waters are employed for drinking, for baths, swimming baths, and douches. The carbonic acid gas obtained from the water may be employed for 'gas douches' (Chapter III.). A small intermittent spring at Saint Nectaire-le-Haut, very rich in carbonic acid gas, is sometimes used as a vaginal douche, to combine the

effect of the gas douche and the ordinary mineral water douche.

The Saint-Nectaire waters are employed in painful rheumatic affections and neuralgias, especially in the form of hot douches; in atonic dyspepsia; and in torpid types of anæmic, scrofulous, and chronic gynæcological affections. The waters have recently been recommended by Ducrohêt in certain forms of albuminuria, especially in those of a gouty nature, and those designated 'phosphaturic albuminuria' by Robin, when as yet the fault lies rather in the general metabolism of the body than in any organic disease of the kidneys. Robin (*Bulletin de l'Acad. de Méd.*, August 17th, 1897) has likewise recommended them as part of the treatment in what he terms 'dyspeptic albuminuria.'

The Bath-establishment of Mont-Cornadore in Saint Nectaire-le-Haut is about three-quarters of a mile from the two establishments and the Casino of Saint Nectaire-le-Bas.

The season is from June to the commencement of October. There are pleasant and interesting excursions to be made in the neighbourhood.

Access: Saint-Nectaire is two hours by omnibus from Coudes, a railway station on the line between Clermont-Ferrand and Issoire.

Accommodation: Satisfactory.

Doctors: Ducrohêt, Porges, and Geneix.

Vic-le-Comte (France, Puy-de-Dôme), on the Allier, possesses several muriated alkaline springs in its neighbourhood, resembling in their chemical constituents the Royat waters. The most important is the Source Sainte-Marguerite (temperature 88° F.) at Saint-Maurice, which contains about 2 per mille of both the bicarbonate and the chloride of sodium, about ·05 per mille bicarbonate of iron, and ·002 per mille arseniate of sodium. The railway station is three miles distant.

La Bourboule (France) in the Auvergne. The waters have been classed in the arsenical group (see Chapter XIII.).

Rouzat (France, Puy-de-Dôme) lies at an altitude of about 1,300 feet, 4½ miles from Riom. The muriated alkaline earthy waters of this spa may perhaps be best mentioned here. The 'Source Grand Puits' (88° F.) was known to the Romans, and contains about 2 per mille of the bicarbonates of magnesium and calcium, 1 per mille common salt, and a little iron.

Vic-sur-Cère (France, Cantal).—The waters will be referred to in the arsenical group (Chapter XIII.).

Pozzuoli (Italy), the ancient Puteoli, on the Bay between Naples and Baja (Baiæ), possesses thermal weak muriated alkaline waters known to the ancients, and still employed. The 'Solfatara,' a half-extinct crater near Pozzuoli, which was much used for natural vapour baths in Roman times, yields sulphurous fumes and a little carbonic acid gas. On the hills above the Solfatara are the Pisciarelli springs (Fontes Leucogæi of Pliny), mentioned in Chapter XII. Not far from Pozzuoli are the hot springs of Bagnoli, and the natural vapour baths or 'Stufe,' called the Bagni di Nerone. The sulphurous Stufe di San Germano are on the south bank of the Lago d' Agnano (an extinct crater), and close to the famous 'Grotta di Cane.'

Ischia.—This beautiful island of the Bay of Naples possesses several thermal springs known from ancient times. The best known is the weak muriated alkaline source of 'Gurgitello' near Casamicciola, the temperature of which varies between 131° and 149° F. According to Palmeri and Coppola (1879), the Gurgitello water (sold also in Naples) contains 2·7 per mille common salt, and 1·5 per mille bicarbonate of sodium (total solids 5·8 per mille). The most satisfactory accommodation in the island is to be had at Casamicciola; but there are likewise hotels at Porto d' Ischia (or Bagno d'Ischia), 3½ miles distant. At the latter place

there is a military thermal establishment founded in 1875, as well as the municipal establishment inaugurated in 1881. Natural vapour baths exist at Castiglione and elsewhere in the island. Sand baths and sea baths can be taken on the shore. The island and bathing arrangements suffered terribly from the earthquake of 1883.

Castellamare-di-Stabia, in Italy (the Roman Fontes Stabiæ), through its beautiful situation on the south coast of the Bay of Naples, is one of the most delightful marine resorts of Italy. It also possesses cold alkaline earthy muriated waters, employed from ancient times. The 'Acqua del Muraglione' is said to contain about 5 per mille common salt and 1 per mille bicarbonate of calcium. Some of the springs contain iron, and two are termed sulphurous.

Essentuki (Russia), in the Caucasus, is situated about 10 miles to the west of Piatigorsk (*q.v.*) and is said to have about the same altitude and climate. It possesses cold gaseous muriated alkaline springs. Others of its springs are sulphurous and only used externally. The best known of its muriated alkaline waters is the spring No. 17, which, according to Dr. F. G. Clemow, has been called the 'Pearl of the Caucasus,' and, according to Thomin (1888), contains 4·3 per mille carbonate of sodium and 3·6 per mille common salt, with minute amounts of barium, strontium and lithium salts. Dried salts and tabloids of the salts are prepared from the spring.

CHAPTER X

SULPHATED ALKALINE WATERS

These waters are useful in constipation, associated with 'abdominal plethora,' also in cases of hæmorrhoids and disturbance of the female pelvic organs, especially when these disorders occur in large eaters and corpulent persons, in whom loss of flesh is to be desired rather than feared.

They may be serviceable also in gastric and intestinal catarrhs, especially in those who have indulged much in the luxuries of the table, in cases of catarrhal jaundice, in tendency to the formation of gall stones, in congestion of the liver, and in enlargement of this organ resulting from fevers and malarial affections in hot climates, in uric acid gravel, and in some cases of gout and glycosuria in fat persons.

Other waters are usually preferable in thin and feeble individuals.

In the results obtained by the sulphated alkaline waters diet plays a most important part, especially so in cases of glycosuria and obesity. By diet is of course meant the diet suitable to the individual patient, not any special 'Curgemäss' diet, such as was formerly employed at some spas more or less uniformly in the case of all patients, no matter what were the differences in their complaints. The amount of fat has certainly to be limited in some cases, and naturally in persons who take the mineral waters on account of obesity. F. Kraus [1]

[1] *Berliner klin. Wochenschr.*, 1897, No. 21.

has however recently shown for the sulphated alkaline waters, such as Karlsbad, just as C. Dapper [1] proved for the muriated waters, such as Kissingen and Homburg, that the proper utilisation of suitable forms of fat in the diet is by no means prevented by the simultaneous employment of the mineral waters in question. Kraus gave considerable amounts of fatty food to hospital patients in C. von Noorden's clinic at Frankfurt, taking care to select only patients who suffered from complaints likely to be met with at Karlsbad; these he treated at the same time with fair daily doses of Karlsbad water. He found that the percentage of the ingested fat, which could be recovered from the patient's fæces, was not unduly increased by the use of the mineral water. Sometimes the mineral water seemed to make hardly any difference in this respect.

It is claimed that chronic enlargement of the spleen occurring as a result of malaria may be diminished by courses of the alkaline sulphated waters; the amount of benefit actually obtained varies much in different cases.

The spas of this group will be described in the following order: Karlsbad, Marienbad, Franzensbad, Tarasp-Schuls, Elster, &c.

Karlsbad (Carlsbad) in Bohemia.—Karlsbad (altitude about 1,230 feet) is a long narrow town stretching upwards in the narrow valley of the Tepl, on both sides of the stream, from its entrance into the Eger for about two miles in a southward direction. Owing to the somewhat cramped position of the houses of the main streets of this ever-increasing spa, some of the guests prefer to live in the buildings situated higher up on the Schlossberg, &c. where the air is fresher and purer; much, however, has been done, and is still being done, to broaden the main thoroughfares and open out the older portion of the spa. Beautiful walks can be enjoyed in the woods covering the slopes of the valley, and a favourite walk which needs no climbing is the one in

[1] *Zeitschr. für klin. Medicin*, vol. xxx.

the valley higher up along the Tepl. In one or other of the cafés along this road guests frequently breakfast after drinking the water.

There are a great many mineral springs at Karlsbad, but they are remarkably similar in their solid constituents, so similar in fact that there is supposed to be some large natural reservoir in the rocks below the town from which the springs all derive their water. Hence one may really speak of a 'Karlsbad water,' which contains about 2·4 per mille sulphate of sodium, about 1·2 per mille bicarbonate of sodium, and 1 per mille common salt, with a moderate amount of carbonic acid gas. It will be unnecessary here to mention all the sixteen springs of Karlsbad water; the chief difference between the various springs lies in their temperature, the hottest, moreover, having the least amount of carbonic acid gas.

The hottest of the springs is the famous Karlsbad Sprudel[1] (temperature 162·5° F.), a steaming fountain leaping up at short intervals in a jerky, irregular way; close by it, along the sides of the Tepl, clouds of steam arise from the ground itself. The Felsenquelle has a temperature of 138° F.; the Schloss-Brunnen of 127° F.; and the Mühlbrunnen of 124·5° F. The Spital-Brunnen in the Strangers' Hospital has the lowest temperature (95·4° F.) of the true Karlsbad waters, for the Stephaniequelle (temperature 71·9° F.), which arises below the Schweizerhof, at some distance from the other fountains, appears to be a spring of true Karlsbad water diluted and cooled during its passage to the surface by ordinary spring water. The Dorotheen-Säuerling, which arises close to the Stephaniequelle, is a simple acidulated spring, the water of which may be used as an ordinary refreshing draught or table water. The neighbouring Giesshübl and Krondorf table waters can be used at Karlsbad.

[1] The German term 'Sprudel' is applied to any gaseous spring which arises with sufficient force to leap up from the ground.

As a general rule, the hotter springs have a less laxative action than the cooler springs. If it is desirable to take the dose cold, the water may be obtained the evening before (the Sprudel, if very little carbonic acid gas be preferred), and allowed to cool at home during the night. Owing to the great number of guests, it is important that not all be told to drink from the same fountain.

During summer the usual time for drinking the waters is from half-past five to half-past eight in the morning, about a quarter of an hour being allowed after each glass (about six ounces). When, however, a comparatively large amount is taken, the daily dose may be divided into two or three portions, a second portion being taken in the forenoon, before the mid-day meal, and occasionally a third portion in the afternoon; this is also the case when the stomach can bear very little of the water at a time. Sometimes a dose is taken cold at bed-time. In former days enormous quantities of the water used to be taken, but now, as a general rule, the dose varies between two and six glasses (of about six ounces each), and in some cases, as for example in cases of chronic diarrhœa, the doctors begin with very small doses, such as half a glass (about three ounces), and even less.

Amongst the conditions for which the internal use of Karlsbad waters is useful, in the first place come affections of the liver, including catarrhal jaundice, frequent attacks of biliary colic, early stages of alcoholic cirrhosis, &c. enlargements of the liver in great eaters (sometimes a part of general adiposity). Then come cases of habitual constipation and hæmorrhoidal conditions in robust people; some cases of chronic gastric or intestinal catarrh with or without diarrhœa; some cases of dyspepsia apparently without organic alteration in the alimentary tract; the uric acid diathesis; chronic glycosuria in fat people, and generally adiposity, which is often combined with a weakly acting heart. It is also

maintained that the lesser degrees of chronic malarial enlargement of the spleen are benefited by a course of the waters. Persons with periodic or frequently recurring headaches connected with abdominal disorders are likewise treated at Karlsbad, and often with great benefit. As a general rule very feeble patients are unsuitable subjects for Karlsbad treatment.

By no means all the patients who come to Karlsbad to drink the waters require a course of the mineral baths in addition. For cases, however, in which baths are indicated, Karlsbad is well provided; it contains six bath-houses, of which the 'Kaiserbad,' just erected by the town, is the most complete, and is one of the most magnificent bath-houses in Europe. In addition to ordinary and mineral water baths there are arrangements for 'moor-baths,' as at Franzensbad, the peat used for these baths being obtained from a part of the Franzensbad moor which belongs to Karlsbad. There are likewise arrangements for douches, hot-air and vapour baths, massage, and Swedish gymnastics.

In conducting the course of treatment, the spa doctor, of course, considers each case for itself with reference to the nature of the affection, the constitution of the patient, and his previous habits. In a great number of cases, such as those of glycosuria, catarrh of the stomach and intestines, obesity, &c. the regulation of the diet is of extreme importance. Formally there was a special 'cure diet,' to which the patient was supposed to confine himself as a matter of course; thus all acid things were supposed to be antagonistic to the proper action of the Karlsbad waters; in no case was butter allowed; and 'Sprudelsuppe,' a soup made with Karlsbad water, formed the chief part of the evening meal. All this is now much modified: the resident doctors regulate the diet, according to ordinary indications to suit the individual patient, and with due regard to his previous habits. The absence of table d'hôte at the hotels assists the patient greatly in following the doctor's

orders, though it must be admitted that the general provision of midday 'couverts' (*i.e.* dinners at fixed prices) must sometimes afford temptation to neglect precise instructions as to diet.

The average daily programme of ordinary 'Kurgäste' at Karlsbad may be shortly sketched somewhat as follows: Rising early to drink the waters at the fountain; in the interval between the glasses promenading to the sound of 'Kur-Musik'; then walking to some café, often to one of those beyond the town along the Marienbaderstrasse, and taking breakfast (at about 9 A.M.). This consists of coffee or tea, with rolls and perhaps boiled eggs or ham: a curious habit prevailing at Karlsbad is that the guests, after taking the waters, often buy their rolls direct from a baker, and carry them to the place where they breakfast. At about one o'clock the chief meal is taken, then coffee or tea at about four, and a light supper in the evening. Those who have been ordered a course of baths mostly take them in the forenoon; promenades, listening to bands and concerts, or walks and excursions for those who are advised to take more active exercise, occupy the remaining intervals in the day. The old idea that *all* the invalids must take a large amount of walking exercise is now recognised as entirely erroneous.

The season lasts from the middle of April to the end of September, but guests are also received at other times of the year, though of course most of the hotels would then be shut. An 'after-cure' should always follow the course at Karlsbad (Chapter XXI.).

Access: By various routes in about 31 hours: either by Cologne, Würzburg and Nürnberg or Bamberg; or by Cologne, Leipzig, Dresden, and Komotau; or by Paris, Stuttgart, and Nürnberg.

Accommodation: Good, but in the height of the season rooms should be secured beforehand.

Doctors: Von Hochberger, J. Mayer, Neubauer, J. Kraus (senior), F. Kraus (junior), B. London, Oscar

Kraus, Hermann, C. Becher, Hertzka, Kallay, Lebovici, Smita, &c.

Marienbad (Bohemia).—This now much-frequented spa is beautifully situated (at an altitude of about 2,000 feet) in a rather open valley, and sheltered by an almost complete circle of hills, on which beautiful walks may be enjoyed amongst the pine forests.

The chief of the springs are the Kreuz-Brunnen and the Ferdinands-Brunnen, which are sulphated alkaline springs resembling those of Karlsbad, but are cold instead of hot, richer in the sulphate, bicarbonate, and chloride of sodium, and in carbonic acid gas, and containing respectively ·048 and ·084 per mille bicarbonate of iron. The Kreuz-Brunnen contains about 4·9 per mille sulphate of sodium, 1·6 per mille bicarbonate of sodium, and 1·7 per mille common salt, the sulphate of sodium being about double the amount in the Karlsbad springs. The Ferdinands-Brunnen resembles the Kreuz-Brunnen, but is richer in the above-mentioned saline constituents and in carbonic acid gas (5 per mille sulphate of sodium, 1·8 per mille bicarbonate of sodium, and 2 per cent. chloride of sodium). The Waldquelle and the Alexandrinenquelle, situated respectively at the north and south ends of the town, are more weakly mineralised, but distinguished for their relatively larger amount of bicarbonate of sodium and of carbonic acid gas. (The Waldquelle has 1·4 per mille bicarbonate of sodium to 1 per mille sulphate of sodium.) The Ambrosius-Brunnen and the Karolinen-Brunnen are chalybeate springs, the first being much the stronger, and being said to contain as much as ·166 per mille bicarbonate of iron. The Rudolfsquelle is an alkaline earthy spring, which may be compared to the Helenenquelle at Wildungen. All the Marienbad springs are cold.

From the variety of springs it may be seen that different classes of cases can be treated at Marienbad. Patients with vesical catarrh and urinary complaints

may be benefited, as at Wildungen, &c. by drinking the water of the Rudolfsquelle, and observing the proper precautions as to diet. The Waldquelle is used as an aërated alkaline spring in chronic catarrh of the respiratory organs. Anæmic patients may drink the chalybeate waters of the Ambrosius-Brunnen, if it does not interfere with their digestion.

On the whole, however, the main class of patients coming to Marienbad are those likely to be benefited by a course of sulphated alkaline waters—namely, full-blooded and stout people who have led a sedentary life and fed largely; this class of patients, suffering from dyspepsia, the uric acid diathesis, chronic constipation, hæmorrhoids, or chronic catarrh of the large intestine, or affected with general obesity, possibly with enlargement of the liver and a weakly acting heart, may often be benefited by a course of waters at Marienbad. In such cases the Kreuz-Brunnen or Ferdinands-Brunnen are mostly employed. Furthermore, hepatic troubles, such as catarrhal jaundice, gall stones, and incipient cirrhosis, may be treated as at Karlsbad; so also chronic glycosuria in obese or fairly well-nourished persons. In the glycosuric and hepatic cases, as well as in many others, it is better to have the waters warmed, by which process they become very much like the waters of Karlsbad. Kisch[1] draws attention to the use of a course at Marienbad in some cases of fatty infitration of the heart; in obese persons who are the subject of valvular disease, with perhaps commencing signs of disturbance in compensation; also in nervous disorders of the heart, associated with a gouty condition, habitual constipation, or in women, with the onset of the climacteric period.

At Marienbad, as at Karlsbad, treatment by baths takes a secondary place, but there are four bath-houses, and all sorts of baths may be obtained. An eighth Marienbad spring, the Marienquelle, poor in solid constituents, but rich in carbonic acid gas, is used for

[1] Marienbad, als Curort für Herzkrankheiten, 1897.

mineral-water baths; water from the Ferdinands-Brunnen and the chalybeate Ambrosius and Caroline springs are also used; the latter spring contains 1,514 per mille volumes of free carbonic acid gas; the indications for these baths are similar to those for the so-called 'iron baths' and other gaseous (effervescent) baths. 'Moor baths' (general and local) are given as at Franzensbad, and may be used in various chronic gynæcological affections, or in some cases merely as a variety of thermal bath. The ferruginous peat, used for Marienbad moor baths, is asserted to be as rich or richer in iron than the Franzensbad peat. There are arrangements at Marienbad for douches, hot air and vapour baths, and likewise for carbonic acid gas baths, for which the gas arising from the Marienquelle is made use of.

The season lasts from May to September. An 'after-cure' is always advisable after a course of waters at Marienbad (see Chapter XXI.).

Access: Similar to that for Karlsbad.

Accommodation: Very good.

Doctors: Von Basch, Herzig, von Heidler-Heilborn, Kisch, E. Ott, Opitz, Porges, A. Grimm, &c.

Franzensbad, in Bohemia.—Franzensbad, near Eger, founded by the Emperor Francis II. in 1793, is situated in a flat part of the country at an elevation of about 1,500 feet above the sea-level. The moorlands, whence is derived the peat used for the famous 'moor baths' of Franzensbad, immediately adjoin the town.

There are twelve different mineral springs, as well as a simple acidulated spring, which resembles ordinary effervescent 'table-waters.' These twelve springs are all cold and rich in carbonic acid gas, but in their solid mineral constituents differ considerably. The Salzquelle, Franzensquelle, Wiesenquelle, and Kalte Sprudel, all used for drinking, are sulphated alkaline springs, whose waters contain 2·7 to 3·5 per mille sulphate of sodium, ·67 to 1·1 per mille carbonate of sodium, traces of other carbonates, about 1·2 per mille common salt, with ·009

to ·030 per mille of the carbonate of iron. Of these springs the Salzquelle contains the least amount of iron (only ·009 per mille of the carbonate), and is, therefore, the one which most resembles the waters of Karlsbad; this resemblance can be increased by warming its waters to the temperature of one of the Karlsbad springs. The Neuquelle is similar, except that it is now said to contain much more iron than the others. The Stahlquelle contains about ·079 per mille bicarbonate of iron, and less of the other salts (1·6 per mille sulphate of sodium, with a total solids of only 3·1 per mille), so that it may fairly be ranked as a strong chalybeate spring.

Franzensbad possesses four well-provided bath-houses, at which the three principal kinds of baths employed are the following: (1) The 'Stahlbäder.' This term is somewhat confusing. By it the mineral-water baths are meant, in which the warming process is so arranged (method of Schwarz) as to occasion the least possible escape of carbonic acid gas. The heating in these baths is effected by a steam chamber or steam pipes at the bottom of the bath. (2) The 'Luisenbäder' or 'Mineralbäder.' These are the ordinary mineral-water baths, in which steam is passed through the mineral water to heat it (method of Pfriem), necessitating the escape of the greater amount of carbonic acid gas. Thus, by the loss of the gas, the 'Luisenbäder' are rendered less stimulating than the 'Stahlbäder.' (3) The 'Moorbäder,' for which Franzensbad has attained such a notoriety. The peat used for these baths is obtained from moorland in the immediate neighbourhood of the town, and the supply is so plentiful that the peat used for one bath need never be used a second time. According to Dr. Paul Cartellieri as much as 25 per cent. by weight of the disintegrated peat, when ready for use, consists of substances soluble in water, and 9·7 per cent. is sulphate of iron. The usual temperature at which the 'moor baths' are given is 89·5° to 95° F.; they act as a huge poultice to the abdomen and lower limbs, and

should not cover the upper part of the chest. Local peat baths, still more resembling poultices, are likewise given.

Besides the above-mentioned three chief kinds of baths, general and local baths of carbonic acid gas are likewise sometimes employed at Franzensbad. In the general gas bath the patient, clad in a light bathing-dress, sits or stands in a sunken space, into the bottom of which a pipe leads, conveying carbonic acid collected from the mineral waters. An overflow-pipe carries off the carbonic acid at a certain height, and thus avoids the danger of the patient inhaling it. A subjective sensation of warmth in the lower limbs and the part of the body bathed by the gas is produced, but the exact therapeutic value of these gas baths remains doubtful.

At Franzensbad the daily dose of water is often divided into two portions, one to be taken before breakfast and one later on in the forenoon.

Owing to the differences between the various mineral springs at Franzensbad, different classes of cases can be treated at this spa. The sulphated alkaline Salzquelle can be used internally, warmed if necessary, in the same class of cases as the Karlsbad waters; the sulphated alkaline Neuquelle, Franzensquelle, &c. are useful, owing to their iron constituent, in anæmic conditions associated with constipation; whilst the purer chalybeate 'Stahlquelle' may be given in such anæmic cases as are benefited by ordinary chalybeate treatment.

Franzensbad has, however, obtained an especial reputation as a 'ladies' spa,' and by far the majority of the 'Kurgäste' belong to the female sex. They include girls and women suffering from chlorosis and other anæmic or cachectic conditions; cases of functional nervous troubles often allied with a debilitated condition of the whole body; dyspeptic troubles in which those Franzensbad waters most similar to the Karlsbad ones are likely to be useful; chronic rheumatic and gouty affections, when likely

to be benefited by a judicious course of baths; lastly, there are the patients suffering from various affections of the pelvic organs. Of the latter class some are anæmic and likely to be benefited by drinking the iron waters, others are benefited by drinking from the more laxative springs; the 'Stahlbäder' or the 'Luisenbäder' exert a favourable effect in leucorrhœa and catarrhal conditions of the pelvic organs, and the 'Moorbäder' often help to promote the absorption of old pelvic exudations. The moor-baths are likewise employed in various rheumatic, functional-nervous, and cutaneous disorders. Broadly speaking, they are contra-indicated in diseases with a tendency to acute exacerbations, in diseases of the heart and blood-vessels, in tendency to hæmorrhage from various organs, and during pregnancy and generally during menstruation.

The season at Franzensbad lasts from May to the end of September. An 'after-cure' following treatment at Franzensbad is always to be desired (see Chapter XXI.).

Access: Similar to that for Karlsbad.

Accommodation: Good.

Doctors: Klein, Sommer, Straschnow, Fellner, Steinschneider, Egger, &c.

Tarasp-Schuls (Tarasp-Schuls-Vulpera), Switzerland (Canton Grisons).

The Kurhaus of Tarasp is situated in the Lower Engadine Valley, at an altitude of 3,890 feet, on the left (northern) bank of the Inn, that is on the opposite side of the river to the picturesque old castle of Tarasp, which cannot be seen from the establishment itself. The neighbouring villages of Schuls (altitude 3,970 feet) and Vulpera (altitude 4,180 feet) lie in a rather more open and sunny position and enjoy a more extensive view, but the peculiar secluded position of the Kurhaus and its proximity to the 'Trinkhalle' give it special attractions for some persons. The mineral waters have been known since the sixteenth century, but it is only in comparatively recent times that they have been duly

appreciated. Some of the springs yield sulphated alkaline water, known in the neighbourhood as 'Salzwasser'; others yield gaseous chalybeate water known as 'Sauerwasser.'

Amongst the sulphated alkaline springs, the Lucius and the Emerita, the two used for drinking, are the most important. According to Husemann (1872) they contain 2·1 per mille sulphate of sodium, which is about the same amount as that of the Karlsbad springs, but they are cold and much richer in bicarbonate of sodium, common salt, and carbonic acid gas than the Karlsbad water. The amount of sodium bicarbonate is 4·8 per mille, equalling that of Vichy; of common salt 3·6 per mille; of bicarbonate of calcium 2·4 per mille, and of bicarbonate of iron ·02 per mille. The Emerita spring differs from the Luciusquelle solely in being not quite so rich in free carbonic acid gas.

Amongst the chalybeate springs the 'Bonifacius' is the strongest, containing, according to Planta (1859), ·045 per mille of the bicarbonate of iron, together with 1·4 per mille bicarbonate of sodium, 2·7 per mille bicarbonate of calcium, and much free carbonic acid gas. The Wyquelle, which arises above the village of Schuls, contains, according to Planta (1859), ·03 per mille bicarbonate of iron and 1·7 per mille bicarbonate of calcium (total solids, only 1·9 per mille) with about the same amount of free CO_2 as the 'Bonifacius' spring. The waters of both these springs can be obtained, when required, at the 'Trinkhalle' of the Lucius and Emerita springs, close to the Kurhaus. The gaseous weaker chalybeate 'Suotsasse' spring at Schuls (·01 bicarbonate of iron and 1·4 bicarbonate of calcium) is much used at the spa as a pleasant table-water. In the neighbourhood there are several other gaseous springs.

About three hours distant is the chalybeate spring of Val Sinestra (*q.v.*), rich in carbonic acid gas and containing arsenic. The Val Sinestra water can be now obtained at Schuls, freshly brought each day from the spring.

Besides the baths of gaseous water, which may be obtained at Schuls, as well as at Tarasp, there are arrangements for providing Rheinfelden brine baths, and Battaglia mud baths at the Kurhaus of Tarasp.

The sulphated alkaline water is employed internally in chronic constipation, hæmorrhoids, dyspeptic conditions, and catarrh of the bowels when occurring in stout full-blooded persons; in cases of gall stones; in glycosuria of fat persons, &c. It may be made more to resemble the Karlsbad water by warming it before drinking; and this is especially important in cases of gall stones and allied affections. As much care is needed for the diet of individual cases at Tarasp as at Karlsbad.

The action of the chalybeate waters of Tarasp in anæmic and debilitated conditions is doubtless greatly aided by the Alpine climate. The arsenic contained in the water of Val Sinestra might exert a special influence in cases of malarial cachexia. The indications for the gaseous baths (warmed to the temperature required by coils of steam) of Tarasp and Schuls are similar to those of other so-called 'iron baths' and baths of other gaseous (effervescent) waters.

The season lasts from June 15 to September 15. Regarding 'after-cures,' see Chapter XXI.

The neighbourhood of the spa is suitable for ordinary summer residence as well as for those undergoing a course of waters; the climate is bracing, the soil porous, and the accommodation sufficient and excellent; the scenery is beautiful, and there are plenty of gently sloping walks on either side of the valley away from the dusty roads.

Access: Six hours by diligence over the Fluela pass from the railway station of Davos; nine hours by diligence from the station of Landeck (for those coming from the north-east). The dust on the roads may sometimes be excessively disagreeable.

Accommodation: Good.

Doctors: Leva (in Tarasp), Vogelsang and Dorta (in Schuls), Denz (in Vulpera).

Elster (Bad Elster) in the Kingdom of Saxony.—Elster (altitude 1,550 feet), situated near the Bohemian frontier in a valley protected from the east wind, possesses cold waters of two classes.

The 'Salzquelle' belongs to the sulphated alkaline group (Flechsig in 1873 gave 5·2 per mille sulphate of sodium, 1·6 per mille bicarbonate of sodium, ·8 per mille common salt, ·06 per mille bicarbonate of iron, and much carbonic acid gas), and is said by Pollach and Flechsig to rank between the 'Kreuz-Brunnen' and the 'Ferdinands-Brunnen' of Marienbad; the indications for treatment are the same for this spring as for those of Marienbad.

The other springs of Elster are compound chalybeate, and of these the one used for drinking, 'Marienquelle,' contains ·06 per mille bicarbonate of iron, ·7 per mille bicarbonate of sodium, 1·8 per mille common salt, 2·9 per mille sulphate of sodium, and much carbonic acid gas. Owing to the admixture of laxative saline constituents the Elster chalybeate waters differ in their action from the pure chalybeate waters of Schwalbach, and resemble rather the compound chalybeate waters of Franzensbad. They may be used especially in those cases of anæmia in which there is a tendency to constipation. The 'iron baths' of Elster resemble other gaseous baths in their action. Ferruginous 'moor baths' are likewise made use of. The season lasts from May 15 to September 20.

Access: Elster is a station on the railway between Reichenbach and Eger.

Accommodation: Satisfactory.

Doctors: Peters, Pässler, Hahn, Helmkampf, Bechler, Bach, &c.

Bertrich (Rhenish Prussia).—This spa (altitude 500 feet), beautifully situated in the Eifel, in the Uesbachthal between Treves and Coblenz, one hour from the Moselle

River and the railway station of Bullay, possesses tepid waters (91° F.) containing sulphate, bicarbonate, and chloride of sodium, with free carbonic acid gas. The mineral waters of Bertrich are in their constituents similar to those of Karlsbad (*q.v.*), but only about one-third as strong. In their internal action they are therefore much weaker than the Karlsbad waters, and approach the indifferent thermal group. They are used internally in some cases of dyspepsia, gouty complaints, and the uric acid diathesis. The tepid baths exercise a soothing effect in irritable neuroses. The season lasts from May 1 to the end of September.

Rohitsch, Rohitsch Sauerbrunn, or Heiligen-Kreuzbad (Styria), three hours from Cilli and one and a quarter hour's drive from the railway station of Pöltschach, possesses a mild climate and beautiful situation 730 feet above sea-level. Its cold gaseous springs are rather weak members of the alkaline sulphated group. The Tempel-Brunnen and the Styria-Brunnen are the ones employed for drinking and export; the total solids in the Tempel-Brunnen is about 7·5 per mille, consisting chiefly of sulphate of sodium, and the bicarbonates of sodium, magnesium, and calcium; the Styria-Brunnen is similar, but contains much more bicarbonate of magnesium (4·5 per mille). The amount of common salt in the Rohitsch waters is under 1 per mille.

Though much weaker in sulphates than the cold alkaline sulphated springs of Marienbad, those of Rohitsch are found useful in cases of dyspepsia associated with constipation, gastric and intestinal catarrh, &c. The Tempel-Brunnen can be employed as a dietetic drink with meals. The season is May 1 to the middle of October.

CHAPTER XI

SULPHATED AND MURIATED-SULPHATED WATERS

The sulphated waters (see p. 33) are much employed for their simple aperient action in constipation and dyspepsia allied with constipation, especially in strong, stout, and full-blooded persons. Since the stronger waters of this class are chiefly used as occasional aperients, they, or the salts derived from them, are exported and taken in the patient's home more frequently than at the spring itself, where, as a rule, there is no proper accommodation for patients. Many patients prefer taking natural purgative waters to other aperients.

Amongst the best known are Franz-Joseph, Hunyadi-Janos, Aesculap, Apenta, and the other 'Hungarian bitter waters'; the Rubinat and Condal waters of Rubinat, and the water of Loëches or La Margarita in Spain; Birmenstorf and Müllingen in Canton Aargau, near Baden in Switzerland; Püllna, Sedlitz,[1] and Saidschitz in Bohemia; Ivanda, near Temesvar in Hungary; Galthof, near Brünn, in Moravia; *Eau Verte* of Montmirail[2] in the Department of Vaucluse in France. Some of these waters are very strong, that of Gran in Hungary containing $4\frac{1}{2}$ per cent. sulphate of magnesium, and

[1] The 'Sedlitz powders' of apothecaries are made with tartaric acid, and, therefore, of course do not imitate the constituents of natural Sedlitz water.

[2] Montmirail likewise possesses sulphurous and weak chalybeate springs.

those of Rubinat and CARABANA[1] in Spain containing about 10 per cent. sulphate of sodium; VILLACABRAS, a Spanish water, is said to contain 12 per cent. sulphate of sodium; it has the decided effect one would expect such a water to have. Of those mentioned above the weakest are those of Galthof, Sedlitz, and Ivanda.

Little need be said of the English sulphated waters, which have at one time or another been employed. Amongst them are those of Victoria Spa in Warwickshire, Purton Spa in Wiltshire, Cherry Rock in Gloucestershire, Scarborough in Yorkshire, and the original spring (practically no longer used) at Epsom. The sulphated waters near London, of Kilburn, Sydenham Wells, Streatham, Barnet,[2] and Northaw, were all at one time much employed, those of Streatham till quite recently.

We shall now proceed to the *muriated sulphated* springs. The waters of this group, many of which (as Brides) have a decidedly alkaline reaction, contain a considerable proportion of common salt, sufficient to modify the action of the sulphates. FRIEDRICHSHALL in Saxe-Meiningen possesses a bitter water, containing a considerable amount of common salt (24 per mille) and chloride of magnesium (12 per mille), together with sulphate of sodium (18 per mille). The figures given in brackets are those of Prof. Oscar Liebreich, but Justus von Liebig (1846) and Bernhard Fischer (1894) make the proportion of solid constituents less. The mineralisation may have undergone slight natural variations. The common salt in this water is supposed to enable it to

[1] According to Dr. A. Proust's report (Paris, 1885), Carabana water contains 100 per mille sulphate of sodium, 4 per mille sulphate of magnesium, 2·2 per mille of the chlorides of sodium, magnesium, and calcium, and ·049 per mille of sulphide of sodium.

[2] In Charles II.'s reign such waters were apparently taken at the wells early in the morning, as laxative saline waters are now usually taken at foreign spas. Pepys, in his diary, mentions how on a very cold morning, August 11, 1667, at seven o'clock, he found many people drinking the waters at Barnet Wells.

be taken for a longer period than other bitter waters without disturbing the digestion or causing depression and emaciation.

Brides-Salins (France, Savoy) includes the neighbouring spas of Brides-les-Bains and Salins-Moutiers. Brides-les-Bains is situated in the deep valley of the Doron [1] at an elevation of about 1,860 feet above the sea. It is about 3½ miles from the railway station of Moutiers-Salins, and 2½ miles from Salins-Moutiers. The spa is well sheltered from excessive winds, for the direction of the valley is east and west, and at the east it is protected by the Vanoise group of mountains (Grand Bec, &c.), of which there is a good view. The rather weak muriated sulphated springs have a temperature of 96° F., and, according to Willm (1890), contain 1·8 per mille common salt, about 1·2 per mille sulphate of sodium, ·5 per mille sulphate of magnesium, about 1·7 per mille sulphate of calcium, and a minute quantity of iron and arsenic.

The waters in small doses have a tonic 'eupeptic' action according to Dr. Delastre, but in larger doses have a laxative action. They are used internally in chronic constipation, dyspepsia with constipation, and the uric acid diathesis, and have lately been recommended by Delastre in certain gouty cases of albuminuria, and in forms of albuminuria, such as that termed 'phosphaturic albuminuria' by Robin, depending rather on a vice of the general nutrition than on any organic change in the kidneys. To some extent they can be employed in hepatic affections, such as are ordinarily treated at Karlsbad, and in cases of chronic intestinal catarrh, hæmorrhoids and 'abdominal plethora,' especially in patients of a rather delicate type. The daily dose required to produce a laxative effect varies much in different individuals: in some cases it is necessary to add

[1] One should say strictly 'Doron de Bozel.' 'Doron' is the word applied to any mountain stream or torrent in the Tarentaise, just as 'Gave' is in part of the Pyrenees.

a dose of the Brides salts [1] to produce it. The common salt in these waters renders their action less debilitating than that of ordinary sulphated waters. The Brides waters are also used for baths, but the visitors at Brides often bathe at the neighbouring Salins-Moutiers.

Salins-Moutiers or Moutiers-en-Tarentaise (altitude 1,610 feet) lies lower down in the valley between Brides and Moutiers, about a mile from the railway station. Its muriated waters (temperature 96°) contain, according to Willm (1890), 13 per mille common salt, and a small amount of the sulphates of calcium and magnesium. They are fairly rich in carbonic acid gas, and are used chiefly for baths (single baths, piscines for families, and swimming baths) in scrofulous and rickety children, convalescent and delicate persons, and for cutaneous affections. The baths are suited for some forms of rheumatism, and might perhaps be arranged, like those of Nauheim in Germany (*q.v.*), for the treatment of cardiac affections. The 'eau-mère' of Salins-Moutiers, which contains 25½ per cent. common salt and 1½ per cent. sulphate of magnesium, may be used to strengthen the baths if required.

Brides and Salins likewise have arrangements for ordinary hydrotherapeutic treatment, ascending (rectal) douches, box vapour baths (Berthe system), &c. Massage and Swedish gymnastics are employed when required. The resources of the station are very great, and the treatment can therefore be varied to suit many different classes of cases.

The well-sheltered Alpine station of Pralognan (4,670 feet) can be reached by a drive of 3½ hours, and is suitable in many cases for an after-cure. The Brides-Salins season is June to September.

Access : The station of Moutiers-Salins may be reached during the season in about 23 hours from London *viâ* Paris.

[1] What are sold as Brides salts are the salts obtained from the Brides waters, but with the greater part of the common salt removed.

Accommodation: Good, notably at Brides. In addition to the ordinary table d'hôte a special diet table is going to be instituted by the chief hotels.

Doctors: Delastre, Laissus, Desprez, Gonthier, Philbert.

Saint-Gervais (France, Department of Haute-Savoie).—The spa of Saint-Gervais lies in a gorge about 2,000 feet above the sea-level, in the neighbourhood of the grand Alpine scenery of Chamonix. It possesses three thermal muriated sulphated springs: the Source de Mey (108° F.), the Source de Gontard (102° F.), and the Source du Torrent (102° F.) According to Willm's analysis of 1889, they contain 1·7 per mille sulphate of sodium, 1·7 per mille chloride of sodium, and ·9 per mille sulphate of calcium. The Source du Torrent is the only one which contains sulphuretted hydrogen.

These waters (slightly laxative in large doses) are employed in cutaneous affections, chronic rheumatism, dyspepsia with chronic constipation, &c.

According to Égasse and Guyenot the so-called 'chalybeate spring' of Saint-Gervais no longer contains any iron. The season is from June 1 to the end of September. The bath establishment has been rebuilt since the disaster of 1892.

Access: About $2\frac{1}{4}$ hours by diligence (15 miles) from the railway station of Cluse. A railway is in course of construction from Cluse.

Accommodation: Besides the spa itself, guests can lodge at the village of Saint-Gervais, which lies higher and gets more sun.

Doctors: A. Wisard, J. Guéridaud.

Other French muriated sulphated waters but little known are those of Cruzy (Department Hérault), Ydes (Department Cantal), and Miers (Department Lot). The latter water, however, contains very little chlorides, and has an admixture of gypsum.

Leamington (England, Warwickshire).—Leamington (altitude about 200 feet) is situated in a very beauti-

ful and historically interesting part of England. It possesses muriated sulphated waters, having a minute quantity of carbonate of iron. The pump room stands in the lower part of the town, on the right bank of the river Leam. On the other side of the road is the Jephson public garden, named after Dr. Jephson, to whose management and reputation at the early part of the present century the development of the spa is largely due. The garden to some extent rivals the 'Kurgarten' of Continental spas.

According to Prof. Brazier's analysis the water of the 'Public Fount' contains about 8·5 per mille common salt, 1·2 per mille sulphate of sodium, 2·0 per mille sulphate of calcium, and ·87 per mille sulphate of magnesium. The water of the 'Aylesford Well' contains slightly more sulphate of sodium.

Leamington is resorted to by those who suffer from hepatic troubles after long residence in hot climates; by those who have too freely indulged in the pleasures of eating and drinking; by those suffering from chronic gouty and rheumatic affections. The presence of the sulphates of sodium and magnesium imparts a slightly aperient action to the waters (if as much as a pint is taken), which is useful in the preceding classes of cases and in chlorosis, when combined with iron medicines. The diet is regulated by the local doctors.

In suitable cases, besides the internal treatment and baths, massage and various hydrotherapeutic appliances are employed, which are specially useful in the treatment of old adhesions about joints, the results of rheumatism or injuries. The 'Nauheim' treatment for affections of the heart has been practised lately at Leamington.

Access: From Euston Station (London) in three hours.

Accommodation: Good.

Doctors: F. Thorne, Thursfield, Eardley Wilmot, F. W. Smith, Haynes.

Cheltenham (England, Gloucestershire).—Cheltenham (altitude about 150 feet) is a flat town, lying in the

Severn Valley and sheltered from east winds. It possesses muriated-sulphated and chalybeate waters. The chalybeate waters are represented by the 'Cambray Chalybeate Spring,' which, according to an old analysis, is said to contain as much as ·1 per mille of the carbonate of iron. According to Prof. T. E. Thorpe's analysis of 1893 the 'Lansdowne Terrace Well' contains about 5·6 per mille common salt, 2·2 per mille sulphate of sodium, and ·7 per mille sulphate of magnesium. The three 'Pittville Wells' have no sulphate of magnesium, whilst the 'Chadnor Villa Well' and the 'Cottage Well' have 1·7 and 1·8 per mille sulphate of magnesium, but only ·4 to ·6 per mille common salt.

Cheltenham has been made a special resort by those who have suffered from a prolonged residence in hot climates and those who suffer from gouty affections. Owing to the competition of foreign spas the town has lately not been nearly so much resorted to for its mineral waters as it was at the commencement of the century. Dr. G. H. Ward-Humphreys (*Quart. Med. Journ.*, Vol. VI., p. 139) thinks the climate is suitable in cases of bronchial catarrh with scanty secretion, in arterial atheroma, in the manifestations of senility, and in cardiac affections requiring exercise on the level. For overgrown and delicate children Cheltenham has the advantage of its educational facilities.

Access: From London (Paddington Station) in about 3½ hours.

Accommodation: Good.

Doctors: Wilson, Ward-Humphreys, Bennett, &c.

Melksham (England, Wiltshire, 13 miles east of Bath, altitude. about 110 feet), like Cheltenham and Leamington, possesses muriated sulphated waters. It likewise possesses a chalybeate spring.

Grenzach (Grand Duchy of Baden) lies at the foot of the Niederberg, at an elevation of 920 feet above sea-level, about four miles by railway from Bâle. It possesses a cold muriated sulphated water, containing

earthy salts, and poor in free carbonic acid gas (according to Bunsen's analysis 3·2 per mille sulphate of sodium, 1·9 common salt, 1·1 sulphate of calcium, ·7 bicarbonate of calcium), which is made use of in the 'Emilienbad' for drinking and bathing in cases of dyspepsia, gall stones, hæmorrhoids, &c.

Karlsbad near **Mergentheim**, in Würtemberg, possesses the Karlsquelle, a cold muriated sulphated spring, rich in carbonic acid gas. This water contains 13·3 per mille common salt, 3·7 per mille sulphate of sodium, and 2·5 per mille sulphate of magnesium. It is used in some cases of chronic constipation, chronic catarrh of the stomach and intestines, &c. The spa contains a bath establishment and arrangements for the reception of guests.

Salzerbad (Lower Austria) is situated at an altitude of 2,000 feet, near the railway station of Hainfeld. It possesses muriated sulphated waters (14·1 per mille common salt, 2·8 chloride of calcium, and 4·6 sulphate of sodium) and arrangements for baths.

Termini-Imerese on the northern coast of Sicily, the 'Thermæ Himerenses' of the Romans, possesses hot mineral waters (108·5° F.), which, according to an old analysis, belong to the muriated sulphated class. The establishment is small, but the place may become a useful health resort in the future. The mean annual temperature is 65·6° F.

TABLE SHOWING THE AMOUNT OF SULPHATE OF SODIUM AND SULPHATE OF MAGNESIUM, &c., IN SULPHATED, MURIATED-SULPHATED, AND SULPHATED-ALKALINE WATERS.

Names of springs	Sodium sulphate per mille	Magnesium sulphate per mille	Other mineral constituents
FRANZ-JOSEPH, according to Prof. Attfield	24	24·6	1·6 magnesium chloride, 1·8 calcium sulphate, 1·5 sodium carbonate
HUNYADI-JANOS, according to the *Lancet*,[1] Dec. 5, 1896	17·3	16·7	1·5 sodium chloride
ÆSCULAP, according to Molnar	13·9	17·2	2·9 sodium chloride, 2 calcium sulphate
APENTA, according to Tichborne, 1896	18·6	21	1·7 sodium chloride, 2·6 calcium sulphate
ROYAL HUNGARIAN, according to J. Bernarth	17·8	29	4·4 sodium chloride, 2·7 sodium carbonate
IVANDA	12·4	2·4	2·3 sodium chloride
CAUCASUS bitter water (near Piatigorsk)	8·33	7·6	2·5 sodium chloride, 2·0 calcium sulphate
GRAN	—	45	——
PÜLLNA, according to L. Godeffroy[2]	9·5	10·8	1·5 calcium sulphate, 2·5 common salt
SEDLITZ . . .	—	13·5	1·4 calcium sulphate
SAIDSCHITZ, according to Berzelius	6	10·9	1·3 calcium sulphate, 3·2 nitrate of magnesium
GALTHOF	4·9	7·4	
BIRMENSTORF, according to Bolley	7	22	1·2 calcium sulphate
MONTMIRAIL ('Eau Verte')	5	9·3	1·0 mixed chlorides, 1·0 calcium sulphate, 0·5 mixed bicarbonates
CONDAL, according to Paris École des Mines, 1889	44·6	3	1·8 sodium chloride, 1·6 calcium sulphate
RUBINAT	96	3	2 sodium chloride, 2·1 other sulphates
CARABANA . . .	100	4	2·2 sodium, magnesium and calcium chlorides, 0·049 sodium sulphide
VILLACABRAS . . .	122	0·9	0·9 sodium chloride, 2 calcium sulphate
FRIEDRICHSHALL, according to Oscar Liebreich	18·2	—	24 sodium chloride, 12 magnesium chloride
BRIDES-LES-BAINS . .	1·2	0·5	1·8 sodium chloride, 1·7 calcium sulphate

[1] The analysis by R. Fresenius in 1878 makes the amount of sulphates slightly greater.

[2] Struve makes the amount of the sulphates greater, and gives 2·3 per mille chloride of magnesium.

Names of springs	Sodium sulphate per mille	Magnesium sulphate per mille	Other mineral constituents
Leamington (Public Fount)	1·2	0·87	8·5 sodium chloride, 2 calcium sulphate
Cheltenham (Lansdowne Terrace Well)	2·2	0·7	5·6 sodium chloride
Karlsbad in Bohemia (Sprudel)	2·4	—	1·29 sodium carbonate, 1 sodium chloride, 0·003 carbonate of iron
Marienbad (Kreuzbrunnen)	4·9	—	1·6 sodium bicarbonate, 1·7 sodium chloride, 0·048 bicarbonate of iron
Franzensbad (Salzquelle)	2·8	—	0·6 sodium bicarbonate, 1·1 sodium chloride, 0·009 carbonate of iron
Tarasp (Luciusquelle)	2·1	—	4·8 sodium bicarbonate, 3·6 sodium chloride, 2·4 calcium bicarbonate, 0·02 bicarbonate of iron
Elster (Salzquelle)	5·2	—	1·6 sodium bicarbonate, 0·8 sodium chloride, 0·06 bicarbonate of iron

Doses.—When only an ordinary aperient effect is required, the smallest amount which is found to exert such an effect is the proper dose, but this amount differs widely for different individuals. The stronger waters, such as Villacabras, Carabana, Rubinat and Condal, are taken in doses of one to four ounces (two to eight tablespoonfuls), but sometimes more is required. One to five ounces of the Hungarian bitter waters (Hunyadi-Janos, &c.) or of Friedrichshall is a usual dose, but the double amount is often necessary. The ordinary dose of Püllna and Saidschitz is a tumblerful of about ten ounces.

CHAPTER XII

IRON OR CHALYBEATE WATERS

Iron waters (see also p. 34) are useful in various forms of anæmia, especially those due to some previous acute illness or actual loss of blood. Those containing bicarbonate of iron with carbonic acid gas are more likely to be well borne by the stomach than those containing the more active protosulphate and persulphate. A tendency to constipation, when simply due to debility, is no contra-indication; but in cases when there is dyspepsia with intestinal catarrh, or a tendency to hepatic disorder, their use is better preceded or accompanied by that of muriated or sulphated-alkaline waters, or aperient drugs. In this way they have often to be used in the ordinary chlorosis of girls, as well as in malarial cachexia, or cachexia from residence in tropical climates. Iron waters are contra-indicated in feverish conditions and in severe disturbance of the digestive organs.

Owing to the improvement in the quality of the blood and in the general nutrition of the body, functional nervous affections, neuralgias, sterility, and impotency, when dependent on general debility, are often remedied by the use of these waters.

'Iron baths,' such as those of Spa and Schwalbach, owe their principal effect to the mechanical stimulation of the skin by the bubbles of carbonic acid gas (see Chapter III.). In baths containing sulphate of iron a useful astringent effect may be exerted on the vagina of women with leucorrhœa, and on the skin of persons with great

tendency to sweating. Thermal chalybeate waters, such as some of the Lamalou springs, when used in the form of baths, act doubtless mainly as indifferent thermal waters.

Amongst chalybeate spas, Spa, Schwalbach, and St. Moritz, some of the best-known of this group, will be described first. The other ones will follow in the political geographical order previously made use of, excepting the sulphate of iron waters, which will be mentioned at the end of the chapter.

Spa (Belgium, Province of Liège).—Spa was such a noted and fashionable health resort in the seventeenth and eighteenth centuries [1] that it has given its name as a generic term to all places resorted to on account of the therapeutic virtues of their waters. Unlike many other spas, whose reputation was formerly great, the original spa has maintained its fame as a health resort, though at one time it appeared to be mainly frequented for its gambling tables and its social amusements, both of which still continue to attract many. The town is situated in a sheltered valley of the Ardennes at an elevation of about 1,000 feet above the sea-level; it is beautifully laid out with promenades and avenues, and is surrounded by wooded hills with delightful shady walks, where the fresh air and charming views encourage exercise.

The waters may be classed with those of Schwalbach, &c. as comparatively pure chalybeate, containing a considerable amount of the bicarbonate of iron and a large amount of free carbonic acid gas. The latter makes them pleasant to most people, in spite of a faint trace of sulphuretted hydrogen. The springs chiefly used for drinking are the two situated within the town, of which the 'Pouhon de Pierre le Grand' contains about ·1 per

[1] H. Schaltin even (*Congrès National d'Hygiène et de Climatologie Médicale de la Belgique*, Brussels, 1898, p. 185) thinks that it is to the chalybeate water of Spa, and not to the spring at Tongeren, that Pliny's description refers: 'fontem habet insignem, multis bullis stillantem, ferruginei saporis.'

mille [1] bicarbonate of iron, whilst the 'Pouhon du Prince de Condé' is stated to contain more. The water is cold, and in order that the carbonic acid gas shall not escape it is not warmed, as at St. Moritz, but it is recommended to suck in the water through a glass tube, so as to insure that the stomach be not disagreeably chilled by the sudden swallowing of a glass of cold water. It is only as a precaution against this that the glass tube is of any use, and is not required to protect the teeth, as is commonly supposed.

In former times enormous quantities of the water were drunk, but now the amount recommended rarely exceeds thirty ounces daily, and smaller quantities are taken at the commencement of the 'cure.' The best time for taking the waters, in the majority of cases, is in the early morning on an empty stomach, between six and eight o'clock; and at this time, in the freshness of the morning in the beautiful 'Promenade de Sept Heures,' the patients can really enjoy the stroll between their glasses. Many exceptions are, however, made to this rule. Part of the daily dose may be taken in the forenoon before lunch, or in the afternoon before dinner. Excursions may be made from Spa, and the water of one of the beautifully situated springs in the neighbourhood may be drunk instead of that of the centrally situated springs. At present, however, the neighbouring springs of Sauvenière, Géronstère, Tonnelet, and Barisart are probably more visited by tourists than by actual patients. Very weak patients may have a small glass of milk or coffee or a biscuit before drinking the waters, or may take the waters before lunch or dinner instead of in the early morning. Only in rare cases or in bad weather should the waters be taken in the patient's apartment.

[1] The different analyses appear to have given very different results. The amount of bicarbonate of iron in the 'Pouhon de Pierre le Grand' is variously given as ·07 to ·19 per mille; the amount in the 'Pouhon du Prince de Condé' is stated to be ·27 per mille.

The affections chiefly treated at Spa are chlorosis and anæmia in women; menorrhagia, a disposition to abortion, and other conditions, if dependent on a feeble general state of health; atonic dyspepsia or a simple tendency to diarrhœa in anæmic persons; anæmic and debilitated conditions resulting from prolonged residence in the East, and from past disease of various kinds. In leucorrhœa and relaxed conditions of the female pelvic organs the baths are of great use, and treatment at Spa has a reputation in cases of sterility when dependent on poor general health, and local catarrhal conditions of the uterus.

The bathing establishment at Spa is one of the finest and best arranged ones in Europe, and the bath rooms have the advantage of being large and airy. The establishment is supplied with mineral water by a special spring. The chalybeate baths are considered to act chiefly by the large amount of carbonic acid gas, and the mechanical effect which the bubbles of this gas (as in other gaseous 'iron baths') exert on the nerve-endings in the skin. By an outer chamber, at the bottom of the bath, the waters can be heated to any temperature required, without driving out too much of the gas. Much valued by the doctors at Spa is the hip bath of warm running water, in which the water is heated by a special apparatus before entering the bath; this is especially used in leucorrhœa and female pelvic disorders; the vagina can be kept open by a wire speculum, which the patient can herself introduce, to facilitate the contact of the moving water with every part of the vagina during the bath. Cold water douches are likewise much used at Spa, and hot moor baths, similar to those at Franzensbad and other German spas, can be given in suitable cases, but the latter seem to have too fatiguing an effect on the majority of the class of patients who come to Spa for treatment.

The ordinary iron baths are much used in chlorosis and anæmia, and aid the beneficial effect of taking the

waters internally. Sometimes the waters are much better borne internally after a preliminary course of baths. Dr. Scheuer recommends that, when possible, the bath should be taken early in the morning, the patient rising at six and taking the bath before drinking the waters. The baths are given hot for patients having neuralgic pains, aching in the back, or a tendency to rheumatism; afterwards they may be taken cooler, and finally the more stimulating cold water treatment may be substituted; the cold wet sheet may sometimes be used as a transitional treatment before commencing the cold douches. Occasionally the skin does not react to the mechanical stimulation of the iron (gaseous) baths, and the more powerful treatment by cold water douches is to be preferred from the commencement; in a few cases the ordinary iron baths produce too much irritation. Dr. Scheuer does not advise women to suspend the internal use of the waters during their menstrual periods, but on the whole considers temporary discontinuation of the baths advisable.

Constipation, when produced by drinking the waters, must be rectified by a dose of imported Hungarian 'bitter water,' or some other laxative. At the commencement of the cure, neuralgic pains may be increased, but as this exacerbation soon passes away, recourse may be had to temporary opiate treatment by hypodermics or otherwise. In some cases ordinary pharmaceutical treatment may be combined with that by the Spa waters; thus iodide of potassium may be given when the anæmia is partly due to old syphilis; quinine and arsenic in malarial cases, &c. Regarding contra-indications it may be stated as a general rule that patients inclined to corpulence or to 'abdominal plethora,' those who are 'full-blooded,' and those with considerable arterial degeneration or heart disease, are unsuitable for treatment at Spa. Season, from May to October.

Access: In about 13 hours from London by Calais or Ostend and Brussels, changing trains at Pepinster.

Accommodation: Very good.

Doctors: De Damseaux, Scheuer, Schaltin, Caffe-rata, &c.

Schwalbach, Germany (Prussian Province of Hesse-Nassau).—Schwalbach, officially called LANGENSCHWAL-BACH, to distinguish it from other Schwalbachs, lies at an altitude of about 950 feet in a branch of the Aar valley, in the northern part of the Taunus range. It is a long, narrow town, the upper, south-western portion of which is more modern and comfortable, and constitutes the spa proper.

The waters are cold, strong, fairly pure chalybeate, with excess of free carbonic acid gas and scarcely a trace of sulphuretted hydrogen. Of the different springs, the Stahlbrunnen and the Weinbrunnen are the most used internally. The Stahlbrunnen contains more iron, ·08 per mille of the bicarbonate to the ·06 per mille of the Weinbrunnen. Minute quantities of bicarbonate of manganesium likewise occur in the waters. The 'Lindenbrunnen,' one of the springs used for baths, contains only ·01 per mille bicarbonate of iron, and may be classed with simple acidulated waters. Schwalbach is a very popular spa, especially amongst English and Americans.

The 'iron baths' owe their effect, as at Spa, to the mechanical stimulation of the skin by bubbles of carbonic acid gas. The baths are made of copper, so that the water can be heated with steam from a chamber at the bottom, and that the least possible loss of carbonic acid gas takes place. Peat baths are likewise given; the peat, obtained in the neighbourhood, is mixed with the mineral water, and heated in wooden tubs with steam to the required temperature. The peat baths are often useful before the ordinary 'iron baths' are commenced, but patients must rest after them to avoid fatigue. The ordinary iron baths may be used somewhat cooler as the patient gets better, and reaction takes place more readily. It is expected that

a new building will shortly be added to the existing baths, and will be devoted to peat baths. Massage and ordinary hydrotherapeutic treatment can be employed in suitable cases.

The affections treated at Schwalbach are chlorosis in girls and young women, anæmic conditions and prolonged convalescence in men and women, leucorrhœa and chronic inflammatory conditions of the female pelvic organs, and disorders of the digestive system when partially or wholly dependent on a general condition of anæmia or debility. In leucorrhœa vaginal douches of the mineral water are employed, as well as the baths. The best time for taking the waters is after the mineral baths in the forenoon or in the early morning before breakfast: respecting this, however, the doctors are guided much by the strength and previous habits of their patients. Sometimes the water is recommended to be taken at the midday meal with or without the addition of a white Rhine wine. Massage of the stomach may be useful in some patients to counteract the constipating action of the water.

Access: By railway *viâ* Cologne and Wiesbaden in about 21 hours; or by Cologne and Diez; or two and a half hours' drive from the station of Eltville.

Accommodation: Very good.

Doctors: Franz, K. Genth, Oberstadt, Grebert, Frickhöffer senior and junior, &c.

St. Moritz, Switzerland (Grisons).—St. Moritz-Bad (altitude 5,800 feet), in the valley of the Upper Engadine, is situated on the level ground at the south-western border of the Lake of St. Moritz between this lake and the Lake of Campfer. It is here that the springs rise. St. Moritz-Dorf lies on a higher ground (altitude 6,100 feet), about 1¼ mile distant from the baths. Those that drink the waters can stop at either the village or the baths of St. Moritz (they are connected by an electric tramway), but in recent years the village has acquired a special importance of its own as a climatic winter health

resort for phthisical and neurasthenic patients, and the air at the village is on the whole more bracing than that in the immediate neighbourhood of the springs. Campfer is likewise a good place to stay at.

There are three different cold chalybeate springs, all rich in carbonic acid gas: the Altequelle, or Badequelle; the Neuequelle, also named Paracelsus-Quelle, in honour of Paracelsus, who in his writings mentioned the waters of St. Moritz; and, lastly, the recently discovered Surpunt-Quelle. The two first mentioned contain ·033 and ·038 per mille bicarbonate of iron, ·27 and ·18 per mille bicarbonate of sodium, and about 1·2 per mille bicarbonate of calcium; the third spring contains rather more iron and less solids (1·2 per mille) than the first two springs.

Owing to the amount of carbonic acid gas, the water of St. Moritz is pleasant to the taste; it may be taken by those who are strong enough in the morning before breakfast, or else in the forenoon about an hour before the midday meal, or in the afternoon a couple of hours after; sometimes it is taken with meals. Iron (*i.e.* effervescent) baths are employed as at other chalybeate spas, and hydrotherapeutic treatment can likewise be obtained.

When compared with the springs of Schwalbach, &c. those of St. Moritz are relatively weak in iron and scarcely representative of the chalybeate group, but owing to the climatic advantages of the place they are more effective in many cases than stronger springs at lower situations. On the other hand, there are nervous, excitable patients, who are not suited for the high altitude and dryness of the air of St. Moritz, which, owing to a certain amount of wind, is even more bracing than that of Davos; anæmic cases complicated with albuminuria likewise do not bear the climate well. In the case of feeble patients, or those with excitable vasomotor system, it is advisable to rest some time preliminarily at an intermediate station of somewhat lower altitude, such as Churwalden, or Parpan, Savognin (German, Schweiningen), or Bergün.

The season for the baths of St. Moritz is June 15 to September 15.

Access: From the railway station of Chur by diligence to St. Moritz in about 13 hours, or from the station of Thusis in about 1½ hours less.

Accommodation: Very good. During the season it is advisable to secure rooms in advance.

Doctors: Veraguth, Holland, Berry, Hoessli, Nolda, Bernhardt (Samaden), &c.

Tunbridge Wells, England, Kent.—The water of Tunbridge Wells (altitude about 420 feet) belongs to the pure chalybeate class, and, according to the analysis by Dr. Y. Stevenson in 1892, contains about ·06 per mille carbonate of iron. The chalybeate spring was accidentally discovered in 1606 by Dudley, third Baron North, whose health improved much during the time he made use of it. After some time a village grew up around the spring, and the spa was a most fashionable resort in the last century, when Bath was at the height of its prosperity. It is now a very popular health resort, and still crowded with visitors, but only a few come to drink the waters. There are several open commons in the neighbourhood, affording excellent opportunity for walks in the fresh air.

The pump-room and 'Pantiles' (an old-fashioned arcade of shops) are situated in a hollow, and one has to descend to get to them from any other part of the town. The waters are only employed internally, and do not contain the carbonic acid gas so important in the internal and external use of the foreign chalybeate waters of Schwalbach, St. Moritz, &c.

Doubtless the climate largely contributes to the benefit derived by anæmic and enfeebled persons at Tunbridge Wells. In bad cases of chlorosis the climate should be assisted by pharmaceutical preparations, especially if the mineral water is not well digested. The chief season for Tunbridge Wells is from June to September.

Access: About an hour and a half by rail from London.

Accommodation: Good.

Doctors: Ranking, Wilson, Rix, &c.

Stafford and Saltburn, which have been mentioned amongst brine baths (Chapter VII.), likewise possess chalybeate waters. So do Cheltenham and Melksham, which have been mentioned amongst the muriated sulphated waters (Chapter XI.); Harrogate, described in the sulphur class (Chapter XIV.); and Buxton, described in the indifferent thermal group (Chapter VI.). The Shanklin chalybeate water, according to Prof. J. Attfield's analysis of 1896, has a total mineralisation of ·38 per mille, and contains ·068 per mille carbonate of iron.

Amongst other chalybeate waters which are known or have been known in England one may mention: Flitwick Well, near Ampthill, in Bedfordshire (whose ferric sulphate waters are sold in bottles); Sandrock, near Blackgang Chine, in the Isle of Wight (containing alum); Gilsland Spa (the sulphur waters are mentioned in Chapter XIV.) in Cumberland; Horley Green, near Halifax, in Yorkshire; St. Ann's Well at Brighton in Sussex; Dorton in Buckinghamshire; and the recently discovered Lady Ida Well at Knockin in Shropshire; all of these are sulphate of iron waters. Amongst the chalybeate, or supposed chalybeate springs nearer London some of the following were formerly well known: Dulwich Spa; Hampstead Wells; Shadwell[1] Spa near the Tower of London; Bagnigge Wells, near King's Cross: Sadler's Wells, or the 'New Tunbridge Wells,' at Islington; Hoxton, Coldbath Wells, and Bermondsey Spa. Readers of the books by Dr. J.

[1] Shadwell apparently derived its name from an older 'St. Chad's Well.' Another St. Chad's Well at Battle Bridge (now King's Cross) seems not to have been chalybeate, but to have had a slightly aperient action, like the neighbouring St. Pancras' Well, also resorted to in the eighteenth century.

Macpherson and Dr. A. B. Granville on the spas of England will find some interesting information about these once more or less popular springs.[1] Some of them are discussed in 'A Treatise on the Origin, Nature, and Virtues of Chalybeate Waters,' by D. W. Linden (first edition, London, 1748), a German physician, who was likewise the first to write on the waters of Llandrindod in Wales.

In Scotland the chalybeate springs at Vicar's Bridge, near Dollar, one in Moffat, and the Hartfell Spa, near Moffat, may be mentioned as examples of sulphate of iron springs. Trefriw in North Wales, amidst the beautiful scenery of the Vale of Conway, two miles from Llanrwst railway station, has waters which contain much sulphate of iron and sulphate of aluminium. King Arthur's Well, five miles from Carnarvon, contains, according to Muspratt, 0·05 per mille carbonate of iron.

Ireland has chalybeate springs at Castleconnell (County Limerick), Ballyspellan (County Kilkenny), Tralee Spa (on the north shore of Tralee Bay, County Kerry), and Lisdoonvarna (see Chapter XIV.).

Haarlem, in Holland, possesses cold, muriated chalybeate waters (Wilhelmina spring), containing 3·2 per mille common salt according to Gunning's analysis.

Kudowa or **Cudowa,** in Prussia (Silesia), lies on a table-land about 1,270 feet above sea-level, near the Bohemian border. Its alkaline chalybeate springs are all rich in carbonic acid gas. The Eugen-Quelle is richest in iron, and, according to P. Jeserich, contains ·06 per mille bicarbonate of iron, 1·29 per mille bicarbonate of sodium, and ·0025 arseniate of iron. The good air plays a great part in the results obtained in cases of anæmia, debility, and convalescence. The climate is tolerably mild. Ferruginous 'moor baths' and gas baths are to be had. The nearest railway

[1] See also Warwick Wroth, *The London Pleasure Gardens of the Eighteenth Century*, London, 1896.

station is Nachod, four miles distant, on the Breslau and Prague line.

Accommodation: Fair.

Doctors: Jacob, Scholz, &c.

Reinerz, Prussian Silesia (altitude 1,860 feet), lies in the county of Glatz, a district rich in mineral springs. Its climate is fresh, and one of its cold gaseous alkaline-earthy chalybeate springs contains ·05 per mille bicarbonate of iron. There are walks in the neighbourhood which can be used for a 'Terrain-Cur,' after Oertel's plan. Ferruginous moor baths can be obtained. Railway stations: Rückers-Reinerz, Nachod (12½ miles), Glatz (17 miles).

Langenau or **Niederlangenau** (Prussian Silesia), likewise in the county of Glatz, has a sheltered position in a pleasant valley, about 1,130 feet above sea-level. According to Poleck (1883) the cold gaseous chalybeate 'Emilienquelle' contains ·049 per mille bicarbonate of iron. Ferruginous moor baths and hydrotherapeutic treatment are likewise made use of. This quiet health resort is a quarter of an hour from the railway station of Langenau.

Flinsberg (Prussian Silesia) lies in the Queis-Thal, on the northern slope of the Tafelfichte, at an altitude of 1,700 feet. It possesses cold gaseous chalybeate springs, of which the two used for drinking contain about ·04 per mille bicarbonate of iron. In the neighbourhood are walks suitable to a 'Terrain-Cur,' after Oertel's plan. The place lies in the midst of pine forest, and has a stimulant and refreshing climate. The railway station is Friedeberg (an hour's drive).

Godesberg, in Rhenish Prussia, is a favourite summer resort and place for hydrotherapeutic treatment on the Rhine, four miles above (to the south of) Bonn. It possesses two gaseous chalybeate springs, of which the 'old' one contains ·029 per mille bicarbonate of iron, with 1·4 bicarbonate of sodium and about 1·0 common salt, whilst the 'new' spring, only used for bathing,

contains more iron (·05 per mille of the bicarbonate) and less other solid constituents.

Accommodation: Good.

Doctors: Oberdoerffer, Pohl, Schwann, &c.

Driburg in Prussia (Province of Westphalia).—This spa lies at an elevation of 730 feet in a pleasant valley of the Teutoburg Forest. Of its cold earthy chalybeate springs the 'Hauptquelle' is the strongest, and, according to R. Fresenius, contains ·07 per mille bicarbonate of iron, 1·4 per mille bicarbonate of calcium, 1 per mille sulphate of calcium, and much free carbonic acid gas. The Hersterquelle, to the south of Driburg, contains only ·02 bicarbonate of iron. The Caspar-Heinrich-Quelle contains a smaller total of solids, but more carbonic acid gas; it may be compared to the 'Georg-Victor-Quelle' in Wildungen. Gaseous iron baths are employed, and for preparing sulphurous peat baths the neighbouring sulphur spring of Saatz is made use of. There are two good bath establishments, the old one and the 'Kaiser Wilhelm Bad.' The station of Driburg is on the railway between Holzminden and Altenbeken, five miles from Altenbeken. The season is May 15 to October 1.

Accommodation: Fair.

Doctors: Foss, Lünnemann, Zengerling.

Freienwalde on the Oder (Prussia), in Mark Brandenburg, is a summer resort of the people of Berlin, and possesses chalybeate waters (Königsquelle) with ·02 per mille carbonate of iron, poor in carbonic acid gas. Ferruginous moor baths are employed.

Neustadt-Eberswalde or **Eberswalde** (Prussia), situated in a beautiful region of Mark Brandenburg (altitude 100 feet), is a summer resort, and contains chalybeate waters poor in carbonic acid gas.

Bibra (altitude 410 feet), a small summer health resort in Prussian Saxony, possesses weakly mineralised chalybeate springs.

Pyrmont in Germany (Principality of Waldeck-Pyrmont).—This spa (altitude about 420 feet) lies in the

beautiful valley of the Emmer, with wooded country around. It possesses cold chalybeate and muriated springs.

Of the chalybeate springs the two chief ones used for drinking (Hauptquelle and Helenen-Quelle) contain, according to Fresenius (1864), about ·07 and ·03 per mille bicarbonate of iron, 1 per mille bicarbonate of calcium, ·8 sulphate of calcium, and ·5 sulphate of magnesium; they are both rich in free carbonic acid gas, but the Brodel-Brunnen used for baths is still richer, containing about 1,540 volumes per mille of carbonic acid gas.

The muriated waters of Pyrmont contain, according to Wiggers, from 7 ('Trinkquelle') to 32 ('Bohrloch-soole') per mille common salt. The 'New Well' contains less common salt (1 per mille) than any of the other muriated waters, but has ·05 per mille bicarbonate of iron.

The bath arrangements are good. Baths are given both of the muriated waters and of the gaseous iron waters. The ferruginous peat of Pyrmont is made use of for 'moor baths.'

By means of the two classes of waters patients can be treated at Pyrmont for anæmia, debility, scrofula, functional nervous affections, &c. The season is from the beginning of May to October 1. Pyrmont was amongst the earliest foreign mineral water resorts which obtained a reputation in England.

Access: By Cologne, Elberfeld, Soest, and Altenbeken; with about 18 to 20 hours of travelling.

Accommodation: Good.

Doctors: Seebohm, Gruner, Weitz, Schücking, &c.

Berka on the Ilm (altitude 770 feet), a climatic health resort in the Grand Duchy of Weimar, possesses weak chalybeate waters. There are establishments with arrangements for pine baths, moor baths, hot sand baths, &c.

Imnau (Germany), in the Principality of Hohenzollern, is pleasantly situated in the valley of the Eyach,

at an elevation of 1,140 feet above the sea. Of its cold gaseous chalybeate springs the richest is the Kasper-Quelle, which contains ·05 per mille bicarbonate of iron, ·03 per mille bicarbonate of manganesium, and 1·4 per mille bicarbonate of calcium. The Fürsten-Quelle, likewise rich in carbonic acid gas, contains only about ·01 per mille bicarbonate of iron. Imnau is reached in half an hour from the railway station of Eyach.

Accommodation: Satisfactory.

Doctor: Scheef.

Liebenstein, in the Duchy of Saxe-Meiningen, lies at an altitude of 1,450 feet, sheltered on the north and north-east by the Thüringer Wald. There are beautiful walks in the surrounding forests. It is much visited by north-Germans, and contains two cold gaseous chalybeate springs and a hydrotherapeutic establishment. The 'Altequelle' is the strongest, and, with a total mineralisation of 1·4 per mille, contains, according to an old analysis of E. Reichardt, ·104 per mille bicarbonate of iron, whilst the 'Neuequelle,' with a slightly larger total of solids, contains rather less iron (·08 per mille of the bicarbonate), and more free CO_2. Season May to September.

Accommodation: Good.

Doctors: Waetzoldt, Fülles, Knecht.

Rippoldsau (Rippold's-Au), Grand Duchy of Baden. Rippoldsau (altitude 1,856 feet, the best known of the 'Kniebis spas') lies in a narrow part of the Wolfthal at the southern foot of the Kniebis mountain. The scenery is typical of a thickly wooded Black Forest valley.

Three springs are used for drinking: the 'Wenzels-Quelle,' the 'Josephs-Quelle,' and the 'Leopolds-Quelle.' Their waters, according to Bunsen, contain ·03 to ·09 per mille bicarbonate of iron, about 1·0 per mille bicarbonate of calcium, and rather less than 1·0 of sulphate of sodium; they are cold and rich in carbonic acid gas. From the Josephs-Quelle and the Leopolds-Quelle gaseous sulphated alkaline mineral waters have

been artificially prepared by the addition of sodium carbonate and carbonic acid gas; they are respectively called 'Natroine' (2·3 per mille bicarbonate of sodium and 2·4 of sulphate of sodium), and 'Schwefelnatroine' (2·2 per mille bicarbonate of sodium, 1·7 sulphate of sodium, and a little sulphuretted hydrogen gas), and are said to resemble respectively the Kreuz-Brunnen water of Marienbad, and the Schwefelbrunnen water of Weilbach.

The chalybeate waters are taken internally in anæmia and the complications of anæmia. 'The 'natroine' is intended for use to counteract a tendency to constipation.

For the 'iron baths,' two springs are used somewhat poorer in iron, but richer in carbonic acid gas, than the springs used for drinking; the baths are heated by the Schwarz method.

Various hydrotherapeutic means can be employed, and there are moor baths which are made with peat from Franzensbad in Bohemia. The season is from May 15 to September 30.

Access: By train *viâ* Strassburg and Offenburg, or Cologne and Offenburg to Wolfach, and thence $2\frac{3}{4}$ hours' drive.

Accommodation: Good.

Doctors: Bächle, Oechsler.

Antogast, Germany (Baden), the oldest of the 'Kniebis spas,' is situated in the Black Forest at an elevation of 1,640 feet, half an hour's drive from the railway station of Oppenau. It possesses three alkaline earthy gaseous chalybeate springs. According to Bunsen (1871), the Trinkquelle and the Antoniusquelle contain respectively ·04 and ·03 per mille bicarbonate of iron with a total of 3 per mille solids.

The alkaline bicarbonates of the water are useful in atonic digestive complaints, and the mountain forest air favours the strengthening action of the iron. The springs have an old popular reputation in the neighbourhood.

Freyersbach in the Black Forest (Grand Duchy of Baden), likewise one of the 'Kniebis group' of spas, lies in the Renchthal at an elevation of 1,260 feet. Of its cold gaseous alkaline-earthy chalybeate springs, the 'Friedrichsquelle' contains ·058 per mille bicarbonate of iron, and ·013 per mille chloride of lithium; the 'Lithionquelle' contains less iron but more chloride of lithium (·017 per mille); the 'Schwefelquelle,' smelling of sulphuretted hydrogen, is richest in iron (·1 per mille of the bicarbonate). The springs all contain ·5 to 1·5 per mille bicarbonate of calcium. Oppenau, 4½ miles distant, is the nearest railway station.

Griesbach, or **Griessbach** (Grand Duchy of Baden), lies in the Black Forest at an elevation of 1,850 feet. This, too, is one of the group of Renchthal or Kniebis spas, and possesses cold gaseous chalybeate waters, of which the 'Antoniusquelle' used for drinking is the strongest, and, according to Bunsen's analysis, contains ·07 per mille bicarbonate of iron, 1·6 bicarbonate of calcium, and ·7 sulphate of sodium. The railway station of Oppenau is 7½ miles off.

Accommodation: Satisfactory.

Doctors: Frech, Haberer.

Petersthal (Grand Duchy of Baden), in the Black Forest, lies at an elevation of 1,330 feet in the Renchthal on the western slope of the Kniebis mountain, five miles from the railway station of Oppenau. Its various cold gaseous chalybeate springs contain, according to Bunte and Rupp (1891), about ·045 per mille bicarbonate of iron, 1·5 per mille bicarbonate of calcium, and ·7 per mille sulphate of sodium.

Teinach, a summer resort in a sheltered valley of the Würtemberg Black Forest, lies at an elevation of 1,310 feet under the Zavelstein. It possesses chalybeate springs and gaseous weakly mineralised alkaline waters used as ordinary table waters. There is a hydrotherapeutic establishment, and comfortable accommodation can be had.

Alexandersbad (Bavaria), on the south-eastern slope of the Fichtelgebirge, near the stations of Markt-Redwitz and Wunsiedel, possesses a cold very gaseous chalybeate spring with about ·06 per mille bicarbonate of iron (Leitzemayer's analysis of 1882); it is used for drinking and bathing. There are likewise arrangements for moor and pine baths, &c. The spa is situated near the Luisenburg, at an elevation of about 1,840 feet above the sea. It can be used as a climatic health resort, or 'after-cure' for patients returning from Karlsbad and Marienbad. The hydrotherapeutic establishment is well known. Season: May 15 to October.

Accommodation: Satisfactory.

Doctor: Faltin.

Steben, one of the oldest spas of Bavaria, is situated in a valley on the declivity of a woody plateau of Upper Franconia, at an altitude of about 1,950 feet, half an hour's drive from the railway station of Marxgrün-Steben. The two cold very gaseous chalybeate springs, according to Hilger's analysis of 1889, contain respectively ·05 and ·06 per mille bicarbonate of iron, with a minute amount of bicarbonate of manganesium. Ferruginous moor baths are made use of. The bathing arrangements and accommodation are good.

Doctors: M. Stifler, Winckler.

Bruckenau, in Bavaria (altitude 980 feet), is beautifully situated on the south-west of the Rhöngebirge, amidst forests of beech and oak. It is a four hours' drive from Kissingen.

The 'Stahlquelle' is a cold weak chalybeate spring (·011 per mille carbonate of iron), rich in carbonic acid gas. Besides this, there are two other springs, the Wernarzerquelle and the Sinnbergerquelle; the latter is a simple acidulated water. Ferruginous moor baths and douches are employed. The season lasts from May 15 to September 30. The chief contingent of patients are women.

Accommodation: Satisfactory.

Doctors: Wehner, &c.

Bocklet, in Bavaria, about 4½ miles drive from Kissingen, in a wooded and protected situation (altitude 690 feet), possesses a compound iron spring, the 'Stahlquelle,' the waters of which contain bicarbonate of iron (·088 per mille), common salt (1 per mille), and much free carbonic acid gas (temperature 50° F.). There is also a less employed chalybeate spring with traces of sulphuretted hydrogen gas. The spa is of use for various anæmic and debilitated patients; also sometimes for an 'after-cure,' following treatment at Kissingen. Ferruginous moor baths are employed. The season is from May 15 to the end of September.

Kohlgrub in the Bavarian Mountains, 1¼ hour's drive from the railway station of Murnau, combines the advantages of an elevated position (2,950 feet above sea-level) with that of a strong chalybeate spring (the Schmelzhaus-Quelle, used for drinking, contains ·09 per mille bicarbonate of iron). Ferruginous moor baths are likewise employed.

Augustusbad in the kingdom of Saxony lies at an elevation of about 720 feet amidst pine woods, half an hour from the railway station of Radeberg. It possesses chalybeate waters (·02 to ·03 per mille bicarbonate of iron) and a hydrotherapeutic establishment. Ferruginous moor baths are employed. The spa is reached from Dresden in less than an hour.

Elster (Germany, kingdom of Saxony) possesses compound iron waters, in which the action of the iron is modified by sulphate of sodium, &c. Elster has already been described in the sulphated alkaline group. (See Chapter X.)

Schandau (Germany, kingdom of Saxony) is pleasantly situated (altitude 400 feet) on the Elbe in the country called the 'Saxon Switzerland.' There is sufficient accommodation, and the place is used as a summer resort. Its weak chalybeate spring contains

·015 per mille bicarbonate of iron and ·24 per mille bicarbonate of calcium. (Railway station of Schandau.)

Rabbi (altitude 4,100 feet) in Tyrol lies in the Val di Rabbi, a branch of the Val di Noce. It possesses two strong alkaline iron springs, the stronger of which (the new one) is said to contain about ·18 per mille bicarbonate of iron and 1 per mille bicarbonate of sodium. The nearest railway station is San Michele (10 hours distant). The season is from the middle of June to the middle of September.

Pejo in Tyrol lies in the Pejo valley to the south of the Ortler district at 4,430 feet above sea-level. It possesses an alkaline chalybeate spring containing, according to Bizio, ·05 per mille bicarbonate of iron. The nearest railway station is San Michele (12 hours' drive).

Sanct Lorenz in Upper Styria possesses muriated alkaline chalybeate springs, which have been already mentioned in Chapter IX. amongst the muriated alkaline waters.

Franzensbad (Bohemia).—This spa, some of whose springs, especially the Neuquelle and the Stahlquelle, yield important compound chalybeate waters, has been described in the chapter on sulphated alkaline waters (see Chapter XI.), to which group most of its springs belong.

Marienbad in Bohemia possesses chalybeate waters of moderate strength, but, for convenience, has been described in Chapter XI. amongst spas with sulphated alkaline waters.

Liebwerda (altitude 1,420 feet), in the north of Bohemia, lies on the south-western slope of the Tafelfichte, half an hour distant from the railway station of Raspenau-Liebwerda. It possesses the cold gaseous 'Stahlbrunnen,' which contains ·03 per mille bicarbonate of iron. The 'Christians-brunnen' is a weakly mineralised, alkaline-earthy gaseous spring, whose waters can be used with meals or as a simple refreshing draught. Ferruginous moor baths are likewise employed.

Koenigswart, a health resort in Bohemia (altitude 2,230 feet), is a railway station on the line from Eger to Pilsen, five miles before the station of Marienbad. The Curhaus lies on a wooded hill half an hour's drive from the station. The cold gaseous chalybeate springs are said to contain ·08 per mille bicarbonate of iron. The Ricardsquelle is a simple gaseous spring. Moor baths are made use of. The position on a mountain slope looking towards the south and the purity of the air are favourable conditions for the treatment of anæmia and convalescence, and for an after-cure to Marienbad, Franzensbad, &c.

Buzias (Hungary) is pleasantly situated at an altitude of about 420 feet, in hilly country, 3½ hours distant from the railway station of Temesvar. Its chalybeate springs are very gaseous, and the strongest are said to contain ·08 to ·1 per mille bicarbonate of iron.

Bartfeld (altitude 1,000 feet) in Hungary lies in a pleasant valley at the foot of the Kamenahola, a spur of the Carpathians. It possesses several cold gaseous muriated-alkaline chalybeate springs, containing a small amount of iodide of sodium. The 'Doctorquelle' has 4·8 per mille bicarbonate of sodium, 1·1 per mille common salt, ·05 per mille bicarbonate of iron, and ·001 per mille iodide of sodium. The 'Hauptquelle' with a total of 3·5 per mille solids (chiefly bicarbonate of sodium) is said to contain ·08 per mille carbonate of iron. The establishment is good, and there are also arrangements for hydrotherapeutic treatment. Anæmic conditions, especially those associated with scrofula or with dyspeptic symptoms, are treated here. The spa may be used as an after-cure to Karlsbad, Marienbad, &c. It is five hours distant from the nearest railway station, Eperies, and half an hour from the town of Bartfeld.

Krynica (Galicia) is beautifully situated in the Carpathians at an altitude of about 2,000 feet, and possesses cold gaseous alkaline-earthy chalybeate waters.

The Hauptquelle contains 1·3 per mille carbonate of calcium and ·029 carbonate of iron. Its use has been recommended in cases of dyspepsia, associated with atony, anæmia and chronic catarrhal conditions. The bathing arrangements and accommodation are satisfactory. The nearest railway station is about one hour distant.

Elöpatak or **Arapatak** (Transylvania) possesses cold strong alkaline chalybeate waters, rich in free carbonic acid gas. It is the most frequented spa in Transylvania, and lies in a pleasant sheltered valley, $12\frac{1}{2}$ miles distant from Kronstadt, at an elevation of about 2,030 feet above the sea-level. The two chief springs contain ·09 per mille bicarbonate of iron, and about 1 per mille bicarbonate of sodium, 1·5 per mille bicarbonate of calcium, and 1·5 per mille bicarbonate of magnesium. The waters are taken in chlorosis and in menstrual and digestive disorders of anæmic persons. Hydrotherapeutic processes can be likewise employed. The season lasts from the middle of May to the end of September.

Borszek, a Transylvanian health resort, is situated at an altitude of about 2,890 feet in the Carpathian Mountains, near the Roumanian frontier, and possesses cold, alkaline-earthy, chalybeate springs, of which the Kossuthquelle (about 5 per mille of the mixed bicarbonates of calcium, magnesium and sodium with ·09 per mille bicarbonate of iron) is richest in iron. Moor baths are made use of.

Amongst other chalybeate (bicarbonate of iron) waters in Germany and Austria may be mentioned those of:—Soultzbach or Sulzbach in Alsace; Hitzacker-Weinberg,[1] in Hanover; Cleve (poor in CO_2), in Rhenish Prussia, near Holland, formerly capital of the Duchy of Cleve; Malmedy, in Rhenish Prussia, near

[1] The gaseous muriated alkaline Juventa spring near Hitzacker is exported to England as a table water, though, according to the analysis of Dr. Ulex, in 1895, it seems to be more highly mineralised than most waters used in this way.

Belgium; the Dinkholder-Brunnen, near Braubach, on the Rhine; Albersdorf, on the Baltic Canal (ferruginous baths and hydrotherapeutic establishments); Hofgeismar, in the Prussian Province of Hesse-Nassau (rather weak); Stettin and Polzin in Pomerania (poor in CO_2); Ronneburg, in the Duchy of Saxe-Altenburg (rather poor in CO_2); Lobenstein (chalybeate waters rather poor in CO_2, ferruginous moor baths), in the Principality of Reuss-Schleiz, in the Thuringian Forest, at an altitude of 1,650 feet; Niedernau, in the Würtemberg Black Forest; Rastenberg, in Thuringia (Saxe-Weimar); Reiboldsgrün, better known for its sanatorium for consumptive patients (altitude 2,300 feet), in the Kingdom of Saxony; König-Otto-Bad (near Wiesau), and Kellberg, in Bavaria; Charlottenbrunn (weak), Bukowine, Alt-Haide, Hermsdorf, near Goldberg, Lauchstädt (poor in CO_2), and Schwarzbach (weak), in Prussian Silesia; Karlsbrunn (altitude 2,520 feet) in Austrian Silesia; Sternberg, Neudorf (or Constantinsbad), Zeidlweid, and Sangerberg (the last three not far from Marienbad) in Bohemia; Mattigbad in Upper Austria; Pyrawarth (·11 per mille bicarbonate of iron, but comparatively weak in CO_2) in Lower Austria; Vellach, or Fellach (altitude 2,750 feet), in Carinthia; Tarcsa, or Tatzmannsdorf (with about ·5 per mille sulphate of sodium, 1·5 per mille bicarbonate of calcium, and 1·2 per mille bicarbonate of sodium), in Hungary, near the borders of Lower Austria and Styria; Szliacs, and other springs near Altsohl (some of them are thermal), Vihnye (two of them are thermal) near Schemnitz, Baldocz (cold alkaline-earthy chalybeate) in the Zips district, Lucsky (altitude 1,960 feet, pleasant situation) in the Liptau district, and Rank-Herlein, 2½ hours' drive from the railway station of Kaschau, all of these localities in Hungary; Korytnica and Boesing, in the Carpathians in Hungary; and Zaizon (see Chapter XVI.), Tusnad and Rodna in Transylvania. Altwasser, in Prussian Silesia, was well known as a

chalybeate spa up to 1869, in which year the springs were greatly damaged by the coal-mining work.

Acquarossa (Switzerland, Canton Ticino), at an altitude of 1,150 feet, is beautifully situated amongst high mountains, in the Val Blenio, about 1½ hour's drive from the station of Biasca on the Italian side of the St. Gothard railway. The waters have a temperature of 77° F., and, according to Koerner's analysis, contain ·034 per mille bicarbonate of iron, ·019 bicarbonate of manganesium, ·00024 arseniate of calcium, ·0025 borate of magnesium, ·0046 chloride of lithium, and 1·1 sulphate of calcium. (The total mineralisation is 2·5 per mille.) The waters deposit a red ferruginous, muddy material, from which they have derived their name, and which is heated and applied externally in the treatment of chronic cutaneous affections.

Tarasp (Switzerland, Grisons) possesses compound chalybeate springs, of which the 'Bonifaciusquelle' is the strongest, containing ·045 per mille bicarbonate of iron, together with bicarbonates of sodium and calcium. See Chapter X., where Tarasp is described amongst the sulphated alkaline group.

The waters of **Val Sinestra,** near Tarasp, are classed in the arsenical group (Chapter XIII.).

Tiefenkasten and **Solis,** near **Alveneu** (Switzerland, Grisons), possess sulphated alkaline chalybeate springs. These are referred to under ALVENEU amongst sulphur waters. (Chapter XIV.)

Andeer-Pignieu.—Andeer in Switzerland (Grisons) lies in the Schamserthal at an altitude of 3,200 feet, about three hours' drive from the railway station of Thusis. The water of the neighbouring spring at Pignieu is conducted to Andeer; it is a weakly mineralised gypsum water (1·7 per mille sulphate of calcium), containing a small amount of bicarbonate of iron (temperature 66°–68° F.). Ferruginous mud baths are likewise made use of. The season lasts from the middle of June to the end of September.

San Bernardino (Switerzland, Grisons) is situated at an altitude of 5,320 feet, on the road from Splügen to Bellinzona, about eleven hours by diligence from the railway station of Chur and seven and a half from Bellinzona. Its cold gaseous earthy chalybeate spring, according to Planta's analysis, contains ·035 per mille bicarbonate of iron, ·01 bicarbonate of strontium, and 1·2 sulphate of calcium, the total of solid constituents being 2·59 per mille. Accommodation is now good.

Fideris (Switzerland, Canton Grisons) lies at an altitude of 3,460 feet in the Praettigau Valley, one hour from the station of Fideris, on the railway between Landquart and Davos. It possesses gaseous weak chalybeate waters (·01 per mille bicarbonate of iron, with a total mineralisation of 1·9 per mille), resembling the class of 'table waters.' The climate plays a chief part in the treatment.

Other chalybeate springs in Switzerland are those of Passugg (Chapter VIII.); Farnbühl (altitude 2,310 feet) in Canton Lucern, an hour from the railway station of Malters; Gonten (altitude 2,900 feet) in Canton Appenzell; Rothenbrunnen in Canton Grisons, with a weakly mineralised compound chalybeate water, and an elevation of 2,000 feet above sea-level; and, lastly, Morgins in Canton Valais, three and a half hours' drive from the railway station of Monthey, with the high elevation of 4,300 feet, but with 2·4 per mille sulphate of calcium in its waters.

Lamalou (France, Department of Hérault) lies at an altitude of 620 feet, in a valley of the southern part of the Cevennes Mountains. The climate is mild, though it is not completely sheltered from cold winds. The springs are situated in three groups, at no great distance from each other: Lamalou-le-Bas, Lamalou-le-Centre, Lamalou-le-Haut; they have temperatures ranging from 59° to 117° F., and are chalybeate and weak alkaline, containing a moderate amount of carbonic acid gas. Each group of springs has its own thermal

establishment; that of Lamalou-le-Bas (Lamalou l'ancien) being the most elaborate.

The 'Source Capus' of Lamalou-le-Centre (temperature 59° F.) is the most chalybeate, containing about ·06 per mille bicarbonate of iron and ·001 per mille arseniate of sodium. It is the most used for drinking in anæmic cases, but has very little carbonic acid gas, and does not keep sufficiently well for exportation. The so-called 'Source Petit-Vichy' (temperature 61·5° F.) of Lamalou-le-Haut has very little iron and a total of only 1 per mille solids (carbonate of sodium, &c.). The Source de la Vernière, situated near the railway station, about a quarter of a mile south of Lamalou-le-Bas, contains 1·1 per mille bicarbonate of sodium, ·5 per mille bicarbonate of calcium, and ·2 per mille bicarbonate of magnesium. It is cold and comparatively rich in carbonic acid gas, so that although it contains as much as ·014 per mille bicarbonate of iron, it forms an agreeable refreshing draught, and is exported in bottles for table use, &c.

The above-mentioned sources are used for drinking, but Lamalou is probably better known for its baths, given at 87·8° to 96·8° F. A favourite custom is for several patients to take their bath together in the same 'piscine.' There are likewise arrangements for douches, vapour baths (for which the natural thermal springs of Lamalou-le-Bas are sufficient), and trained attendants for applying massage.

Lamalou is resorted to for chronic rheumatism, neuralgias, incipient tabes dorsalis, and chronic affections of the nervous system. The late Professor Charcot sent many nervous cases to Lamalou. The season is from May 15 to October 15.

Access: Lamalou is a station on the railway from Bédarieux to Castres.

Accommodation: Good. Patients can have rooms adjoining the baths, and can be carried the short distance in chairs if they require it.

Doctors: Cros, Boissier, Belugou, Donadieu, Ménard, &c.

Bagnères-de-Bigorre (France, Hautes-Pyrénées) possesses some chalybeate springs. This spa is described in the earthy group (see Chapter XV.).

Rennes-les-Bains (France, Department of Aude).—The village is situated in a narrow valley at an altitude of 1,040 feet on the banks of the River Salz, six miles from the railway station of Couiza-Montazels.

Amongst its thermal weak chalybeate springs the hottest is the 'Source du Bain Fort' (temperature 115° F.), which, according to Willm[1] (1890), contains only ·002 per mille bicarbonate of iron, and has a total mineralisation of only ·54 per mille; it might therefore with other similar springs at Rennes be classed in the simple thermal group.

A second class of mineral waters is constituted by the Source du Cercle (temperature 54° F.), the Sources Madeleine, and other springs at Rennes, which, according to Willm, contain sulphate of iron (·15 per mille in the Source Madeleine No. 1), sulphate of aluminium, and a little free sulphuric acid.

A third class of waters at Rennes includes various muriated springs, which run into the Salz stream and have caused it to receive its name. One of the springs contains as much as 56 per mille common salt.

The Rennes waters are made use of by anæmic, rheumatic, and scrofulous patients.

Barbotan (France, Gers), a quiet village (altitude 260 feet) near Cazaubon, 19 miles from the railway station of Mézin, possesses thermal (temperature 59° to 100° F.), chalybeate, and sulphuretted hydrogen

[1] These waters, according to Willm's analysis, contain scarcely enough iron to be termed chalybeate; otherwise they would probably be the hottest chalybeate waters in Europe. In Africa, however, the thermal chalybeate waters of Caledon, Cape Colony, are said by Dr. G. W. B. Daniell to have a constant temperature of 120° F., and, according to Hahn's analysis, contain 0·03 per mille ferrous carbonate, held in solution as a bicarbonate owing to the presence of free carbonic acid gas.

springs. The waters are chiefly employed for mud baths, which are the speciality of Barbotan, and are used in cases of chronic rheumatism and joint affections. The spa is visited mostly by patients from the neighbouring part of France. The season is from the commencement of June to the end of September.

La Bauche (France, Department of Savoie).—Its cold, non-gaseous chalybeate water, which is exported, is said to contain ·14 per mille bicarbonate of iron, and ·03 per mille crenate of iron ; it tastes, however, almost like ordinary spring water. There are arrangements for baths and hydrotherapeutic treatment at the little establishment. The position of La Bauche is most charming ; it lies at an altitude of about 1,640 feet in a broad fertile valley, with the rocky cliffs of the L'Épine mountain on the east, and with a view of the Grande Chartreuse group of mountains on the south. About three miles distant is the railway station of Les Échelles, fourteen miles from Chambéry. The station of Lépin is likewise about three miles off.

Charbonnières (France, Rhone), a village five miles north-west of Lyons, possesses cold chalybeate waters (·04 per mille bicarbonate of iron), poor in free carbonic acid gas.

Luxeuil (France, Haute Saône) has been already described amongst the simple thermal spas. (See Chapter VI.)

Châteauneuf (France, Puy-de-Dôme).—Some of the colder springs, such as the ' Source Morny,' may be classed as chalybeate. The spa has been described in the simple alkaline group (Chapter VIII.).

Renlaigue at Saint-Dierry, in the Department of Puy-de-Dôme, is distinguished amongst French waters as a fairly pure, strong and gaseous chalybeate. According to Mialhe it contains ·08 per mille bicarbonate of iron.

Forges-les-Eaux [1] (France, Department of Seine-

[1] This must not be confused with Forges-les-Bains (in the Department Seine-et-Oise). The latter possesses feebly mineralised cold

Inférieure).—The town (altitude 525 feet) lies on the railway from Paris to Dieppe, *viâ* Pontoise, and owed its reputation to the visit in 1632 of Louis XIII. with his wife Anne of Austria, and his famous minister Cardinal Richelieu. The waters (cold) of the 'Source Cardinale' contain, according to O. Henry, ·098 per mille crenate of iron, with minute quantities of alum and earthy salts; they are poor in free carbonic acid gas.

Orezza lies at an altitude of 1,960 feet amongst the mountains of the north-eastern part of the island of Corsica. It possesses two gaseous chalybeate springs, sometimes, however, containing a little sulphuretted hydrogen.

The following French bicarbonate of iron waters have not yet been mentioned:—Neyrac (a weak alkaline chalybeate, temperature 80° F.) and Le Pestrin in Department Ardèche near Aubenas and Vals; Farette (weak, and poor in CO_2) in Department Savoie; Oriol (gaseous alkaline-earthy chalybeate), near Grenoble, in Department Isère; Saint-Bertrand-de-Comminges (·05 per mille, non-gaseous) in Department Haute Garonne; Clermont-Ferrand (with common salt and bicarbonates of sodium and calcium) in Department Puy-de-Dôme; Château-Gontier (·104 per mille, according to O. Henry, of the carbonate and crenate of iron) in Department Mayenne; Brucourt (non-gaseous, with about ·5 per mille sulphate of magnesium) in Department Calvados. Vic-sur-Cère, Sylvanès and Bussang are described in the arsenical group (Chapter XIII.).

Santa Catarina (Upper Italy).—About three miles from Bormio, at an altitude of about 5,600 feet, has strong chalybeate waters, with a climate analogous to that of St. Moritz in the Upper Engadine.

Recoaro (Italy, Province of Vicenza) lies at an altitude of 1,400 feet, to the south of the Tyrolese Alps, and is about 26 miles from the railway station of Vicenza,

waters, to which it is difficult to attribute any special therapeutic quality though scrofulous children are sent to a hospital there.

with which it is connected by a steam-tramway. Of its many chalybeate springs the best known is the 'Lelia,' which, according to Bizio, contains ·046 per mille carbonate of iron, together with small amounts of carbonate of calcium and of the sulphates of calcium and magnesium; it is rich in carbonic acid gas. The surroundings are picturesque and the accommodation good. In the neighbourhood are the sulphate of iron waters of CIVILLINA, VEGRI DI VALDAGNO, &c. According to Bizio (1878) the Civillina waters contain 3·21 per mille ferrous sulphate, 1·28 sulphate of aluminium, ·02 sulphate of manganesium, ·001 sulphate of copper, 1·3 sulphate of calcium, and ·008 arseniate of iron, with a small amount of free sulphuric acid.

Ceresole Reale in Italy (Piedmont) is described in the arsenical group (Chapter XIII.).

St. Olafs is close to **Modum**, a popular health resort in Norway. It is picturesquely situated at an altitude of about 500 feet, and has a carbonate of iron spring, poor in carbonic acid gas. Mud baths are employed.

In the Caucasus (Russia) are the thermal chalybeate springs of **Jeleznovodsk**, pleasantly situated amongst forests on the southern slope of a hill called Jeleznui Hill (*i.e.* the 'Iron Hill'). The climate is rather bracing. The temperature of the springs is 68° to 112° F., but as the amounts of carbonate of iron given by Dr. F. G. Clemow vary from ·007 to ·01 per mille, it seems probable that some at least of the springs would be better classed in the simple thermal group. The springs may be compared with those of Lamalou in France (*q.v.*).

Lipetsk (Russia, Tambof) lies picturesquely on the River Voronezh, and has cold chalybeate waters and ferruginous peat baths, compared by Dr. Clemow to those of Franzensbad.

We shall now consider foreign *waters containing sulphate of iron*, the English ones having been already mentioned amongst English chalybeate waters.

Alexisbad (Germany, Duchy of Anhalt) lies in the Selkethal at the foot of the lower Harz Mountains, two hours from the railway station of Gernrode. The chalybeate waters used for drinking are the Alexis-Brunnen and the Freundschafts-Brunnen, containing bicarbonate and sulphate of iron. The Selke-Brunnen, containing chloride (·1 per mille) and sulphate (·05 per mille) of iron, and sulphates of sodium, magnesium, and calcium, is used for bathing. 'Soolbäder' and pine baths, douches and massage can also be obtained. The spa has a pleasant sequestered position, at an altitude of about 1,080 feet above the sea-level. The air is fresh and rather moist, and there are pleasant shady walks in the neighbouring woods. The season lasts from the beginning of June to September 15.

Hermannsbad at **Muskau** in Prussian Silesia.—Muskau (altitude 320 feet) on the Neisse, in the Oberlausitz, a station on the branch railway from Weisswasser, possesses cold sulphate of iron waters. The 'Trinkquelle' is said to contain about ·19 per mille sulphate of iron, ·24 per mille bicarbonate of iron, and ·5 per mille sulphate of calcium, whilst the stronger 'Badequelle' has ·75 sulphate of iron, ·54 bicarbonate of iron, and 2·08 sulphate of calcium. Ferruginous moor baths are to be obtained. Hermannsbad lies in the middle of the celebrated park and gardens of Prince Pückler.

Hermannsbad near **Lausigk**, in the kingdom of Saxony, possesses strong sulphate of iron waters (over 4 per mille), containing some arsenic, but they are unsuitable for internal use.

Ratzes (Austria, Tyrol, altitude 3,900 feet) lies in a wooded ravine close to the Schlern Mountain. It possesses a sulphate of iron spring (·3 per mille sulphate of iron), and a cold sulphur spring. The nearest railway station, Atzwang, is three and a quarter hours distant.

Mitterbad (Austria, Tyrol, altitude 3,110 feet), three and a half hours distant from Meran, lies in the

romantic Marau Valley, and possesses a chalybeate spring, containing sulphate of iron, with minute quantities of arsenic and of the sulphates of manganesium, strontium, zinc, and copper.

Parad (Hungary, altitude 660 feet), a station on the railway from Kis-Terenne to Kaal-Kapolna, possessed sulphate of iron waters, the strongest of which is said to contain 5·5 per mille sulphate of iron, and 3·03 per mille sulphate of aluminium. In the neighbourhood is the Cseviczequelle, a sulphurous spring containing 1·1 per mille carbonate of sodium, much carbonic acid gas, and ten volumes per mille sulphuretted hydrogen gas. Further off (two hours' distance) is the Clarissequelle, containing ·06 per mille bicarbonate of iron.

Erdöbenye (Hungary), situated at an altitude of about 780 feet, in a well-wooded valley, three miles from the railway station of Liszka-Tolesva, has waters containing sulphate of iron, alum and arsenic.

Auteuil, in France, a suburb of Paris, possesses a cold chalybeate spring, containing ·71 per mille of sulphate of iron and aluminium, and 2 per mille of the sulphates of calcium, magnesium, and sodium, with traces of arsenic. The total mineralisation is 3·2 per mille. Passy, a part of Paris, also contains sulphate of iron springs, though not employed at present; the analysis of two of them shows the presence respectively of ·045 and ·41 per mille sulphate of iron.

Rio (Elba) has a sulphate of iron spring. Other interesting ones are the hot Pisciarelli springs near Pozzuoli, containing both sulphate of iron and alum, described by Pliny and still used, it is said, by Neapolitans for external application. There are many other sulphate of iron waters in Italy.

The sulphate of iron and arsenical springs of Levico, Roncegno, Vals, Srebernik and Linda-Pausa, will be described in the next chapter. Those of Rennes-les-Bains, and of Civillina and Valdagno near Recoaro, have already been alluded to in the present chapter

amongst ordinary (bicarbonate of iron) chalybeate spas. Amongst other sulphate of iron springs there are those of Ronneby, the best known spa in Sweden; the 'new spring,' containing about 2·5 per mille sulphate of iron and 1·5 sulphate of aluminium, is only used for bathing, whilst the weaker 'old spring' (·33 per mille sulphate of iron, and ·38 sulphate of aluminium) is sometimes used internally; mud baths are likewise employed. Sandefjord, in Norway, described under sulphur spas in Chapter XV., likewise possesses a sulphate of iron water (1·29 per mille).

CHAPTER XIII

ARSENICAL WATERS

Arsenic occurs in appreciable quantities in some mineral waters, so that from their employment one may expect an alterative action in cases of anæmia and various cachectic conditions, especially malarial cachexia, where ordinary chalybeate waters do not act well. These waters may likewise be of use in some chronic skin affections.

The action of arsenic is associated with that of sulphate of iron in the waters of Roncegno and Levico in Italy, and in various other sulphate of iron waters; with bicarbonate of iron in the waters of Ceresole Reale, Val Sinestra, Vic-sur-Cère, Sylvanès, and Bussang; and with that of muriated alkaline waters at La Bourboule. It may be doubted whether the amount of arsenic in the weaker members of this group can exert any special therapeutic action. The weakly mineralised waters of Mont Dore contain the minute amount of ·0009 per mille arseniate of sodium: that is, under one milligramme in the litre.

Besides the waters separately mentioned in this chapter, minute quantities of arseniate of sodium [1] occur in the waters of Royat (·0045 per mille in the 'Source Saint-Victor'), Saint-Nectaire (the 'Source des Dames' is said to contain as much as ·005 per mille), Saint-

[1] Or of arsenic in some other chemical combination, but most conveniently expressed, for the sake of comparison, as if it occurred in th form of arseniate of sodium.

Honoré (arsenic in association with sulphuretted hydrogen, equivalent to about ·004 per mille arseniate of sodium in the 'Source de la Crevasse'), Vichy (·002 in the 'Source Grande Grille'), Uriage (·002), Lamalou (·001 in the 'Source Capus'), and traces of arsenic are found in the waters of Bath, Baden-Baden, Kreuznach, Plombières, Poretta (in Italy), &c.

Court-Saint-Etienne (Belgium, Brabant) possesses a well (altitude about 260 feet), discovered in 1878, said to contain as much as ·0097 per mille arsenic acid, or ·0263 per mille of arseniate of sodium, out of a total of only ·28 per mille solids. The water is used for exportation solely.

La Bourboule (France, Department of Puy-de-Dôme).—La Bourboule is situated in a pleasant Auvergne valley, at an elevation of 2,780 feet above the sea, on both banks of the River Dordogne. The valley of La Bourboule (from east to west) has a direction at right angles to the valley of Mont Dore (from south to north). Mont Dore is four miles higher up the stream.

The waters, which have a sort of chicken broth taste, are distinguished from other muriated alkaline waters by the amount of arsenic they contain. The two principal springs may practically be regarded as one, and be called the 'Source Perrière-Choussy.' Their water has a temperature of 118°–130° F. (140° F. before being pumped up), and, according to the analysis made by J. Lefort and Bouis (1878), has a total mineralisation of 6·4 per mille, containing 2·8 per mille of both the chloride and the bicarbonate of sodium and an amount of arsenic equivalent to ·028 per mille of the arseniate of sodium. The two Sources Fenestre are cold (66° F.) and much more weakly mineralised; they are used for baths to lower the temperature of the other springs. About half a mile from the spa are some new springs, which are cold, and in chemical constitution rather resemble those of Fenestre.

The La Bourboule waters are employed for drinking

(a quarter or half of a glass to commence with), for baths and douches, and for pulverisation and inhalation. In the old inhalation chambers the mineral water is allowed to drop from a height into the centre of the room, so that a certain amount of the pulverised water is inhaled at the same time as the vapour. The patients remain for about half an hour seated in the inhalation chambers, dressed in a sort of large bath-towel or dressing gown. A foot-bath is often prescribed to be taken whilst inhaling. Apparatus for separate inhalation and pulverisation is also much employed.

The waters are used in affections of the respiratory system, and in cases where muriated alkaline waters are indicated, but owing to the amount of arsenic which they are said to contain, a good result may also be expected in many scrofulous and cachectic conditions, chronic malarious troubles, feeble rheumatic and gouty patients, and chronic skin affections, when arsenic is indicated. They have been found useful, it is said, in some cases of glycosuria and albuminuria, and have also a certain reputation in early stages and quiescent conditions of pulmonary tuberculosis. Prolonged baths are sometimes prescribed in chronic cutaneous diseases.

Thermal eruptions, diarrhœa, or other varieties of 'well-fever' (poussée) may be observed during the treatment, but as similar phenomena occur at other spas their appearance at La Bourboule cannot be regarded as always due to the arsenic in the water.

The season is from May 25 to September 30.

Access: By Paris, Orleans, and Montluçon to Laqueuille; omnibus in one and a half hour from the railway station of Laqueuille.

Accommodation: Good.

Doctors: Gilchrist, Méneau, &c.

Mont Dore (France, Department of Puy-de-Dôme).—Mont Dore lies on the Dordogne near its two sources, in a deep valley of the Auvergne Mountains, at an elevation of 3,440 feet above the sea-level. Though not

too much shut in, the spa is almost completely sheltered by Mont Dore and the surrounding heights. Many interesting excursions can be made from the spa.

The thermal springs, one of which at least, the Source César, judging from numerous Roman remains, was known to the Romans, yield weakly mineralised waters, having a temperature of 104°–116·6° F., and containing a minute but appreciable amount of arseniate of sodium (about ·001 per mille) and about ·02 per mille bicarbonate of iron. Their total mineralisation reaches about 2 per mille, and they differ from each other mainly in the amount of carbonic acid gas they contain. The Source Madeleine (temperature 113° F., the only one ordinarily used for exportation) and the Source Bardon (temperature 116·6° F.) are perhaps the two springs most generally employed internally. According to J. Lefort the Source Ramond contains as much as ·05 per mille bicarbonate of iron.

The cold gaseous 'Fontaine Sainte-Marguerite' (temperature 54° F.) is used as a table water.

The thermal waters are used for baths, douches, foot-baths, drinking, gargling, pulverisation and inhalation. In special cases very hot half-baths (sometimes even up to 113° F.) are prescribed; the immersion to last for a few minutes only.

The spa guests include many professional people who have to speak in public, or sing, and are suffering from chronic laryngitis, bronchitis, or other chronic affections of the respiratory organs. In their case the inhalation treatment is much employed. Patients wear a flannel dress in the inhalation-rooms, and are usually carried there and back again in a *chaise-à-porteurs*. On their way there and their way back they mostly drink some of the thermal water. The inhalation treatment (sometimes combined with pulverisation) is only carried out in the morning, and is usually followed by a rest before the *déjeuner* (at half-past ten or twelve o'clock). Patients who undergo this treatment in the morning often take a

thermal foot-bath or some other treatment in the afternoon before dinner.

Mont Dore enjoys a special reputation in the treatment of asthma, and it may be said that more cases are benefited there than at any other place. The success is most frequent in asthma complicated with chronic bronchial catarrh, but not rarely true nervous asthma likewise derives benefit. Relapses, however, are not uncommon. Many of the Mont Dore patients are gouty or rheumatic, and some of them come for functional nervous troubles.

Much of the good result is due to the climate and ordinary thermal treatment. The arsenic is supposed likewise to have some influence. The thermal establishment, recently completed, is one of the finest in France. Gratuitous treatment is provided for poor patients of the neighbourhood. The season is June 15 to September 15.

Access: Six hours' drive from the railway station of Clermont Ferrand; or better, direct from Paris by the Orleans railway to Laqueuille, and thence one and a half hour's drive. Next year the railway from Laqueuille to Mont Dore will be ready for use. *Accommodation:* Good.

Doctors: Emond, Cazalis, Tardieu, A. and J. Mascarel, Percepied, Schlemmer, Joal, Nicolas, Chabory, &c.

Levico, a village in the Austrian Tyrol, lies at the entrance of the beautiful Sugana valley, at an elevation of 1,700 feet above the sea, twelve and a half miles to the east of Trento. It possesses cold sulphate of iron and arsenic waters, used internally for anæmic conditions, malarial cachexia, &c., and externally for catarrhal conditions of the female generative organs, &c. It is in the grottoes of Vetriolo, almost 4,900 feet above the sea, on the southern slope of the Monte Fronte, that the strong and weak springs of Levico are situated. Near the grottoes is the bath-establishment of Vetriolo.

The weak Levico water is mixed with a little of the

strong water for exportation, and then contains ·66 per mille sulphate of iron, and ·00095 arsenious acid. It is taken internally, at the commencement of the course, in doses of one or two tablespoonfuls twice or thrice a day, during or after meals. After two or three weeks the stronger water is used in similar doses, which may be doubled later on.

The strong Levico water contains according to Barth and Weidel (1881) ·0086 per mille arsenious acid, 1·3 per mille ferric sulphate, 2·5 per mille ferrous sulphate, 0·047 per mille sulphate of copper, 0·62 per mille sulphate of aluminium, and a minute quantity of free sulphuric acid.

The season lasts from June 1 to the end of September. When the new arrangements are completed, the accommodation for visitors will be excellent.

Roncegno, a village in the Austrian Tyrol, nineteen miles east of Trento, possesses the strong sulphate of iron and arsenic water of Mount Tesobo. The spa lies in the Val Sugana at an altitude of 1,750 feet, has accommodation for visitors, and will shortly have a railway station on the new Val Sugana line, one hour distant from Trento.

According to Professor Pietro Spica's analysis of 1888 the Mount Tesobo water has a total mineralisation of 7·87 per mille, and contains ·109 per mille arseniate of sodium, 3·11 per mille sulphate of iron, ·028 per mille sulphate of copper, 1·38 per mille sulphate of aluminium, ·21 per mille sulphate of manganesium, ·047 per mille sulphate of nickel, ·025 per mille sulphate of cobalt, ·038 per mille phosphate of iron, ·115 per mille arsenic anhydride (pentoxide), and ·209 per mille organic matter.

The season lasts from May 1 to the end of September.

Ceresole Reale (Italy, Piedmont) is a small village in the valley of the Oreo, which can be reached in about five hours from Turin. It lies at an elevation of 5,290

feet between the Grand Paradis and the Levanna Mountains, both of them over 11,000 feet. The water of the two springs is similar, and contains, according to Sobrero's analysis, ·17 per mille bicarbonate of iron, ·0057 per mille arseniate of sodium, and about ·003 per mille each of bicarbonates of lithium and manganesium. The situation is beautiful, the air bracing, and the accommodation good.

Val Sinestra (Switzerland, Canton Grisons).—The springs of Val Sinestra are about three hours distant from Tarasp-Schuls, and the waters may be obtained at Schuls, freshly brought there each day from the spring; they are likewise exported in bottles. They are said to contain about one-fifth of the amount of arsenic held in the strong waters of Levico, and to have the advantage of containing bicarbonate instead of sulphate of iron. According to Husemann's analysis the Ulrichsquelle contains ·0017 and the Conradinsquelle ·0019 per mille of arseniate of sodium. Both these springs include amongst their constituents about ·03 per mille of the bicarbonate of iron and about 1·5 per mille of the bicarbonate of calcium.

Cudowa, in Prussian Silesia (Chapter XII.).—Arsenic has been found in the Eugenquelle in the form of arseniate of iron. The water of this spring is said to contain ·07 per mille bicarbonate of iron, 1·29 per mille bicarbonate of sodium, and ·0025 arseniate of iron.

Linda-Pausa, in the Kingdom of Saxony.—There are different mineral springs. The sulphate of iron water is said to contain ·003 per mille arsenious acid. Bad Linda is situated at an altitude of 1,750 feet in Saxon Vogtland, half an hour distant from the railway station of Pausa.

Srebernik, or **Srebernicza** (altitude 1,200 feet), in the east of Bosnia. The cold Guberquelle (total solids, ·753 per mille), according to Professor E. Ludwig, contains ·37 per mille sulphate of iron (ferric sulphate), ·227 per mille sulphate of aluminium, ·007 per mille

sulphate of zinc, ·008 per mille sulphuric acid, ·006 per mille arsenious acid. The dose for adults to commence with is two tablespoonfuls.

Hermannsbad, near Lausigk, in the Kingdom of Saxony. (See Chapter XII.)

Civillina and **Valdagno** are mentioned under Recoaro in Chapter XII.

Bussang (France, Department of Vosges) is situated in a valley of the Vosges Mountains at an elevation of 2,200 feet above the sea. The railway station is the terminus of a branch line from Epinal. Its weak alkaline waters are moderately rich in carbonic acid gas; the Source Salmade, out of a total of 1·5 per mille solids, contains ·0086 per mille carbonate of iron, ·003 per mille carbonate of manganesium, and ·0012 per mille arseniate of iron. The water is chiefly exported and drunk at meals.

Sylvanès (France, Department of Aveyron) lies in a mountainous district at an altitude of 1,312 feet, and is reached from the railway station of Ceilhes-Roquere-donde. Its thermal waters (88° to 97° F.) out of a total of about 1 per mille solids are said to contain ·02 carbonate of iron and ·016 of arseniates (iron and magnesium). Sylvanès, because its waters are chiefly used for baths, is sometimes classed amongst simple thermal spas. Those who take the baths here sometimes drink the cold gaseous alkaline waters (1·8 per mille bicarbonate of sodium) of ANDABRE, two and a half miles distant from Sylvanès and Camarès.

Vals (see Chapter VIII.), noted for its cold alkaline springs, possesses also weakly mineralised sulphate of iron springs. The 'Source Saint-Louis,' out of a total of ·4 per mille solids, contains ·04 per mille sulphate of iron, partly the protosulphate and partly the persulphate, and ·001 per mille of arseniates; it likewise contains ·099 per mille free sulphuric acid. The 'Source Dominique,' the best known of this group, contains ·003 per mille arseniate of iron.

Vic-sur-Cère (France, Department of Cantal), lying at an altitude about 2,200 feet at the foot of the Cantal Mountains, possesses cold, gaseous, chalybeate waters, which are said to contain ·05 per mille bicarbonate of iron, ·008 per mille arseniate of sodium, 1·8 per mille bicarbonate of sodium, 1·2 per mille of earthy bicarbonates, and 1·2 per mille of common salt. The establishment lies about three-quarters of a mile off the village, but the waters are chiefly used for exportation.

CHAPTER XIV

SULPHUR WATERS

Although it is difficult to explain the action of sulphur waters, and although their special therapeutic value has been altogether called in question, yet experience seems to show that the stronger waters of this group, at all events, indubitably exercise some therapeutic effect. The action of the very weak sulphur waters is probably similar to that of simple thermal or ordinary hydrotherapeutic treatment, aided by climate, diet, healthy mode of life, and general medical guidance. In compound sulphur waters the action is modified by the presence of other constituents in the waters.

Sulphur waters are used for baths, douches, drinking, pulverisation and inhalation. The complaints treated are chronic rheumatoid arthritis and rheumatic affections, chronic catarrhal conditions of the alimentary canal, hyperæmia of the liver and hæmorrhoids, chronic bronchial, laryngeal, nasal and pharyngeal catarrhs; also constitutional syphilis, chronic metallic poisoning, some scrofulous affections, and chronic skin eruptions.

The action of prolonged sulphur baths in skin affections is probably similar to that of simple thermal baths (see Chapter VI.) or thermal earthy baths, but in some cases the sulphur may exercise a special germicidal action on the skin.

Verdenal[1] of Eaux Chaudes found that a culture of pyogenic microbes grew more slowly when sulphur water was added to the culture than when the same quantity of distilled water was added. He suggests

[1] *Essai d'une Application de la Bactériologie à la Médecine Thermale*, Pau, 1896.

that it might be owing to some mild antiseptic action that in older times certain sulphur waters obtained a great reputation in the treatment of wounds.[1] Thus the waters of Eaux Bonnes were called 'Eaux des Arquebusades,' after the Béarnese soldiers wounded in the battle of Pavia (1525) had resorted thither to be cured. Other sulphur waters, such as those of Barèges, have likewise enjoyed a great reputation for the healing of wounds, but almost the same healing power has been attributed to simple thermal waters (see Chapter VI.).

Treatment by thermal sulphur baths has been esteemed by some authorities at Aachen, &c. as of service to bring out signs of latent syphilis, and useful to show if the virus should be regarded as still remaining in the body. The treatment may thus throw light on the nature of obscure pains, glandular enlargements, loss of hair, &c. which could previously not be traced to syphilis with certainty. The test action by sulphur waters is suggested by Güntz to depend on the action of sulphur in aiding the excretion of mercury from the tissues. According to this theory the mercury is stored in the tissues in the form of an albuminate, and prevents the appearance of syphilitic manifestations; the sulphur treatment accelerates the albuminous catabolism, causing therefore the breaking up and excretion of the albuminates of mercury; the removal of the mercury then allows the syphilis to manifest itself again. Though with a positive result this test action of hot sulphur baths may be of considerable utility, no certain negative conclusions can be drawn from a negative result, and the great diagnostic value formerly attached to the latter result has unfortunately been found undeserved.

The real effect of thermal sulphurous and muriated-sulphurous waters in aiding specific remedies in syphilis

[1] A similar antiseptic action is claimed by Duhourcau, Schlemmer and J. Felix for the alkaline silicates present in most weakly mineralised thermal waters.

is due in part to the good effect of the spa-treatment on the nutrition in general, and in part to their direct influence on the skin. The baths probably also promote the elimination from the body of the specific toxins of the disease, and perhaps increase the antisyphilitic power of the mercury in the tissues (see Chapter XX., Section 5, on Syphilis).

Strong sulphur waters when used internally seem sometimes to exercise an internal antiseptic action, and it is possible that the beneficial effect of sulphur waters in some cases of chronic furunculosis may be in part explained in this manner.

The aperient action of sulphur waters differs widely in different individuals; for chronic constipation the simultaneous use of other aperients is often necessary. The effect of strong sulphur waters in some cases of habitual constipation, abdominal plethora, hæmorrhoids, &c. may be compared with the well-known use of ordinary pharmaceutical preparations of sulphur in many cases of similar nature.

When sulphur waters are taken internally a greenish colouration is sometimes observed in the fæces, especially when the motions are rather loose. H. Roth,[1] and after him others, supposed that this colour, and the blackish appearance of the fæces likewise sometimes observed, were due to the presence of sulphide of iron. Mainly on this observation Roth founded his theory of the therapeutic action of sulphur waters. He thought that the sulphur combined with the iron in the hæmoglobin of the red blood corpuscles, especially of the effete ones, their destruction being thereby accelerated and the products of their destruction excreted by the liver. In this way he explained the diminution in the size of the liver, sometimes noted during treatment with sulphur waters, the improved portal circulation, and the beneficial action in hæmorrhoids, &c.

[1] H. Roth, *Die Bedeutung des kalten Schwefelwassers zu Bad Weilbach in Unterleibskrankheiten, &c.* Wiesbaden, 1854.

H. Stifft[1] of Weilbach showed conclusively that the peculiar colouration of the fæces could not be due to any sulphide of iron which they might or might not contain. Supported by certain observations of Lehmann, he came to the conclusion that the greenish colouration, when present, must be due to bile pigments (biliverdin), which must be either secreted by the liver in increased amount or must be hurried through the intestines and thus escape complete conversion into hydrobilirubin. Stifft's explanation is supported by H. Schulz,[2] one of the most recent writers on the subject.

It seems probable that, at least in many cases of enlarged liver and in well-fed persons, the secretion of bile is, as Stifft and Stern[3] with others think, increased by the use of sulphur waters, and, as the bile pigment is probably derived from blood pigment, it is not improbable that a destruction of superfluous and effete red blood corpuscles does actually take place, as suggested by Roth, though less in anæmic persons than in those of a plethoric type. In this way also may be explained the tendency (in some persons) of prolonged internal courses of the stronger sulphur waters to induce an anæmic condition, which however is usually rapidly recovered from.

Some observers believe that the chief action of sulphur waters is through the nervous system (esp. vasomotor), and Stifft thought that by their use, and the inhalation treatment, a special effect is exerted through the branches of the pneumogastric nerve on the throat, bronchi, stomach, liver, &c. Perhaps really, the stronger sulphur waters (acting more in some individuals

[1] H. Stifft, 'Die Mineralquellen zu Bad Weilbach,' in Grossmann's *Heilquellen des Taunus*, Wiesbaden, 1887, p. 76. Also *Die phys. und ther. Wirkung des Schwefelwasserstoffgases*, Berlin, 1886, pp. 48, 106 and 130.

[2] H. Schulz, *Studien über die Pharmakodynamik des Schwefels*, Greifswald, 1896, p. 64.

[3] Stern, *Bad Weilbach und seine Mineralquellen*, Wiesbaden, 1896, p. 14.

than in others), whilst helping in getting rid of the worn out and useless parts of the blood, exert by means of the nervous system an alterative effect on the general nutrition, and thus pave the way to a kind of regeneration of the blood and to the more perfect functioning of the liver and other organs.

Sulphur waters as a general rule keep badly, and should therefore, if possible, be drunk at the spring itself, in spite of the improved methods of bottling. Polysulphides, if these are present with the monosulphides, are decomposed, some of their sulphur being precipitated, and sulphuretted hydrogen gas being given off. In the waters rich in sodium sulphide a rapid change sometimes takes place on exposure to the air. The carbonic acid in the water and the air combines with the sodium to form carbonate, and a part of the sulphur thus set free constitutes the flocculent precipitate seen at Bagnères-de-Luchon, &c. whilst another part combines in the nascent condition with hydrogen from the water, and is disengaged in the form of sulphuretted hydrogen gas (the characteristic smell of which is not noticed in the pure sodium sulphide waters when quite fresh). Another part of the sulphide of sodium undergoes conversion successively into the hyposulphite, sulphite, and sulphate of sodium. It is to chemical changes of this kind that some of the Pyrenean sulphur waters owe their tendency to alter rapidly (' degenerate ') on exposure to the air. They become alkaline owing to the presence of sodium carbonate. Some of the thermal waters of the Eastern Pyrenees are weakly alkaline and sulphurous, *i.e.* partially degenerated, even when fresh from the source, others are already ' completely degenerated,' and contain no sulphide of any sort, but only a little sulphate and carbonate. Such waters may be practically ranked with the simple thermal group.

Sulphur waters are sometimes divided into different subdivisions, the chief of which are the following three :—(1) Sulphide of sodium waters, in which the

main sulphurous constituent is sulphide of sodium. Such waters are those of the Pyrenean spas : Cauterets, Bagnères-de-Luchon, Barèges, &c. (2) Sulphuretted hydrogen waters, in which the main sulphurous constituent is sulphuretted hydrogen gas. Such waters are those of Schinznach, Weilbach, Aix-les-Bains, Strathpeffer, Llanwrtyd Wells, &c. (3) Muriated sulphur waters, in which besides sulphuretted hydrogen a moderate quantity of common salt is present. Such are the sulphur waters of Aix-la-Chapelle, Uriage, Harrogate (old sulphur spring), Llandrindod Wells (sulphuretted spring at the Pump House), Hercules-Bad, Acqui, &c. This arrangement has not been adopted here.

We shall first describe Bagnères-de-Luchon, Cauterets, Eaux Bonnes, Aix-la-Chapelle, and Aix-les-Bains, and shall then proceed with the other spas of this group in political geographical order.

Bagnères-de-Luchon (France, Haute-Garonne).—Luchon (altitude 2,050 feet) is a most beautiful spa situated on the western side of a broad level valley, and sheltered by mountains in almost every direction. The fertile plain in which the spa lies is an expansion of the Valley of Luchon, where it joins the valleys of Arboust and the Pique. Many Roman remains found in the neighbourhood show that Luchon (Balnearea Lixoniensis) was known to, and its springs used by, the Romans.

The many thermal sulphur springs vary in temperature from 61° to 152° F., and the amount of sulphide of sodium also differs much: that in the Source de la Reine amounts to ·056 per mille, and that in the Source Bordeu to ·07 per mille. The waters become soon altered on exposure to the air, and throw down a precipitate of sulphur. They are used for drinking, for baths and douches and vapour baths, for gargling, in the form of a spray to the throat, for nasal douches, and for inhalation of the vapour (by a special apparatus of Professor A. Frebault). The thermal establishment and

hydrotherapeutic arrangements are excellent. A small swimming bath is supplied with the mineral water. By employing springs of different strengths and temperatures the baths may be made more or less excitant, as required.

Behind the thermal establishment is the mountain of Superbagnères, on the slopes of which are many shady walks, and at the base of which are the galleries excavated in the rock, containing the sources of the different sulphur springs. Owing to the heat and moisture arising from the water, the interesting tour of these galleries could be used as a most effective vapour bath.

The affections treated at Luchon include rheumatoid arthritis and the resulting stiffness in joints, chronic catarrhal diseases of the respiratory organs, torpid scrofulous conditions, chronic cutaneous eruptions, and syphilis. In affections of the respiratory organs inhalation treatment is much employed.

The climate of Luchon is warm, but, owing to its mountainous position, is subject to rather sudden changes. The season is from June 15 to October 15, but the thermal establishment is open throughout the year. Owing to the beauty of its scenery, its amusements and gaiety, and the attractive excursions in the neighbourhood, Luchon is during the season a centre for tourists and ordinary visitors, as well as for patients.

There is a cold chalybeate spring near the Castel Vieil, 1½ mile from the spa.

Access: *Viâ* Paris, Limoges, Toulouse and Montréjeau to the railway station of Luchon, or *viâ* Bordeaux and Montréjeau.

Accommodation: Good.

Doctors: F. Garrigou, P. Ferras, De Lavarenne, Doit-Lambron, Estradère, Serrand, &c.

Cauterets (France, Department of Hautes-Pyrénées). —Cauterets is a little town situated in the narrow winding valley of the Gave[1] de Cauterets, at an elevation of about

[1] The word 'Gave' in this part of the Pyrenees is applied to any mountain stream, just as the word 'Doron' is used in the Tarentaise near Brides-les-Bains.

3,200 feet above the sea-level. This spa enjoys a great reputation in France, and an old one, for it was visited in the sixteenth century by Queen Marguerite of Navarre, the intellectual sister of Francis I. of France.

Of the many thermal sulphur springs the principal ones have temperatures ranging from 103° to 128° F., and out of a total of about ·2 per mille solids, have amounts of sulphide of sodium varying from ·01 to ·022 per mille. The hotter the springs are (just as at Barèges), the more sulphide they seem as a rule to contain; this fact suggests that at their subterranean origins all these springs may have the same chemical composition, but that in their passage by longer or shorter channels to the surface, and according to the strata through which they have to pass, they lose in temperature and richness of sulphide, possibly sometimes by meeting ordinary pure water before they reach the surface. The principal spring is the ' Source la Raillère ' on the banks of the Gave, at a rather bare part of the valley to the south of Cauterets, a good mile distant, and about 400 feet more elevated than the spa. The water (temperature 103° F.) contains ·015 per mille sulphide of sodium, and has a particular reputation in affections of the respiratory organs. The hottest spring, ' Source des Œufs,' supplies the ' Thermes des Œufs,' which forms one building with the Casino. The springs ' de César ' (temperature 118·5° F.), and ' des Espagnols ' (temperature 116° F.), are likewise reckoned amongst the chief.

The principal bath establishments are those of La Raillère, des Œufs, the old establishment of César, and the Néothermes; the last of which is supplied by the César and Rocher springs and by a spring of pure water (Ricumiset).

Besides their internal use and their use for baths and douches the Cauterets waters are very much employed for gargling, for inhalation of the finely pulverised spray or vapour, and sometimes for nasal douches.

The douche-massage after the manner of Aix-les-Bains (*q.v.*) is employed at Cauterets in suitable cases.

The spring of Petit St. Sauveur, as the name implies, is considered to be analogous to the springs of the neighbouring spa of St. Sauveur, and is employed for its more sedative action in many cases of painful and irregular menstruation in young and in erethic subjects. The 'Source Pause Vieux' (temperature 107·2° F) is likewise employed in gynæcological cases. The 'Source Mauhourat' (temperature 121° F., containing ·01 per mille of sulphide of sodium), situated close to La Raillère, is only used for drinking, and has a special reputation in cases of dyspepsia and uric acid gravel.

The principal reputation of Cauterets is however undoubtedly for cases of chronic pharyngitis, laryngitis and bronchitis, including conditions termed clergyman's sore throat, gouty conditions, and the remains of simple catarrhal affections, but not including tuberculous laryngitis, active pulmonary tuberculosis, or chronic bronchitis and emphysema in subjects with decided dilatation or degenerative conditions of the heart.

It cannot be said that Cauterets is well provided with shady and level walks, such as might be desired for many patients. Amongst long excursions for the more robust visitors is the beautiful one up the valley to the Pont d'Espagne (4,880 feet) and further on to the little mountain lake of Gaube (5,710 feet).

The spa life at Cauterets is very characteristic. At an early hour of the morning patients may be seen flocking to La Raillère, which is the spring most employed. All those who can (the majority) make this uphill journey on foot; those who cannot, or will not walk, can go by the electric railway,[1] or in exceptional cases, have the water brought to them at their lodgings. The principal time for taking the waters in the morning is between seven and ten o'clock, a bath or douche is likewise often

[1] Opened in 1897. The railway will soon join the spa itself with the present terminus of Pierrefitte.

taken about that time. About eleven o'clock is the time for the French *déjeuner*, the first real meal. Till then those who are strong enough are advised not to break their fast, but in some cases a cup of bouillon, milk or tea is allowed on rising, or a glass of milk may be taken half an hour after drinking the water, especially by the class of patients for whom Mauhourat water is ordered. The milk may be had fresh from the cows which are kept for this purpose close to the spring. As a rule the doctors advise that the Cauterets waters should not be mixed with milk or sirup, at least when they are taken at the source.

In the afternoon there is a band of music in the town; later on from about four to six o'clock the waters are often drunk a second time, and according to the nature of the case, this is often followed by spraying the throat, inhalation of the vapour, &c. About half-past six is the usual time for the dinner or evening meal. After this there are entertainments at the Casino, &c. to occupy the rest of the day.

Season: May 15 to October 1.

Access: By Paris, Bordeaux, Tarbes, and Lourdes to Pierrefitte; one and a half hour's drive from the railway station of Pierrefitte.

Accommodation: Good.

Doctors: Duhourcau, Evariste Michel, Flurin, Bordenave, Sénac-Lagrange, &c.

Eaux Bonnes (also called Bonnes) (France, Department of Basses-Pyrénées).—The village (altitude 2,460 feet) stretches from north to south in a rocky offshoot of the picturesque valley of Ossau, 26 miles to the south of Pau.

Of the thermal sulphur springs (temperature 72°–90·5° F.) the hottest and most important is the 'Source Vieille' (total solids amount to only ·6 per mille; about ·02 per mille sulphide of sodium; traces of calcic and other sulphides; about ·3 per mille chloride of sodium and other chlorides; flakes of 'barégine'). The waters

of Eaux Bonnes keep better than many other sulphur waters, and do not, like the Luchon waters, whiten on exposure to the air.

The waters are used chiefly in chronic bronchitis, granular pharyngitis, and catarrhal affections of the respiratory organs, especially those associated with much expectoration. The supply of waters is not very great, and they are employed chiefly for drinking, sometimes for gargling, inhalation of the spray, or nasal douches, and but little for baths, whereas the waters of Eaux Chaudes (five miles off) are used principally for bathing and external applications.

The effect of a course is excitant at first, augmenting the secretion from the mucous membranes and the amount of cough. The urine is increased in quantity, the pulse becomes more frequent, and the appetite greater. With this general excitation and exaggeration of symptoms at the commencement of the treatment there may be a feeling of general uneasiness and insomnia, but all this should pass off, and an improvement in the symptoms should take place, or the normal condition should be reached.

Small doses are used at the commencement (half a glass or less), which are gradually increased, but more than three or four glasses are seldom prescribed. Whey, milk, or an ordinary or medicated sirup is sometimes added to the water. The treatment is contra-indicated when there is fever or acute inflammation, in neurotic (dry) asthma, and in very irritable subjects. The 'Source Froide' (temperature 53·6°) is used in dyspeptic conditions.

The 'Promenade Horizontale,' though perhaps as yet hardly shady enough, affords a pleasant level walk for those patients who cannot go up hill. The gently rising 'Promenade de l'Impératrice' requires a little more exertion. The Jardin Darralde in the centre of the spa, where the band plays during the season, and some paths in the surrounding woods, are more shady.

Altogether Eaux Bonnes, in the variety and shadiness of its walks, is decidedly richer than its neighbour Eaux Chaudes. Though the general absence of wind is remarkable, warm clothing should be brought, owing to the fluctuations of the temperature in the Pyrenees. Patients often go to the seaside for an after-cure.

Season: June 1 to September 30.

Access: Three miles from the railway station of Laruns (the omnibus takes almost an hour), the terminus of a branch line from Pau.

Accommodation: Good.

Doctors: Leudet, Cazaux, Valéry-Meunier, Devalz, Leriche, &c.

Aachen (Aix-la-Chapelle) (Germany, Rhenish Prussia).—Aachen (altitude 530 feet) is a very important industrial city in Rhenish Prussia with 96,000 inhabitants, and its size in some respects modifies the character of the place as a spa. In its cathedral are the famous relics of Charles the Great, who has been honoured as the discoverer of the springs and founder of the town, but thermal waters at Aachen were certainly known to the Romans, and were visited in A.D. 756 by King Pepin the Short, at which time the town bore the name of Aquisgrani. It was in 1267, when Richard[1] Earl of Cornwall was King of the Romans, that the 'King's bath' came into the possession of the town.

The town is built on sandy soil, and is fairly sheltered by hills; the climate is moderately moist, and the average temperature is higher than that of Berlin in winter and lower in summer. Its surroundings are beautiful. The Lousberg on the north is only a short walk from the town, and on the south-west the cool promenades of the Aachener Wald (the property of the town) can easily and quickly be reached by the electric tram.

The different springs lie in the middle of the town,

[1] Richard likewise presented to the town the special regalia sent over from England for his coronation.

including the Kaiserquelle (strongest; temperature 131° F.), Quirinusquelle, Rosenquelle, Corneliusquelle, and others. The waters of the various springs are all of them muriated-sulphurous, containing about 2·6 to 2·8 per mille common salt, and about ·6 per mille carbonate of sodium; they differ from each other, however, in temperature (113°–133° F.), and in the amount of sulphur (sulphide of sodium and sulphuretted hydrogen) which they contain.

The Elisenbrunnen derives its water from the Kaiserquelle, and is the one most used for drinking. The water of the Kaiserquelle, &c. artificially freed of sulphur, and impregnated with carbonic acid gas, is sold in bottles as an agreeable aërated table water. At the bath establishments there are arrangements for vapour baths, and various hydrotherapeutic processes, especially the combined douche and massage. In the town there is likewise a 'Zander Institution,' furnished with Dr. Zander's medico-mechanical appliances for Swedish gymnastics.

On account of the chloride of sodium they contain, the waters are taken in catarrhal conditions of the stomach and alimentary canal, and of the bronchi; there are inhalation chambers for bronchial and laryngeal affections. Chronic rheumatoid arthritis, chronic rheumatic and gouty affections, and the resulting stiffness of joints, are much treated by hot douches, massage, &c. A combination of douche and massage is employed at Aachen, similar to the 'Aix douche-massage' at Aix-les-Bains (*q.v.*), but the treatment at Aachen is carried out by a single attendant at a time in most cases.

Chronic skin diseases, such as eczema and psoriasis, are treated at Aachen with some success, the results obtained being in some cases partly due to medicaments, such as chrysophanic acid, &c. applied at the same time.

It is, however, in the treatment of syphilis that

Aachen has become most noted. Seventy per cent. of the patients visiting the spa are syphilitics. By careful and methodical anti-syphilitic medication (chiefly mercurial inunction) the doctors at Aachen have gradually secured this great reputation for their spa. The thermal treatment (hot baths, &c.), by favouring the action of the skin and general metabolism, constitutes a powerful aid to the specific methods adopted (see Section 5, on Syphilis, in Chapter XX.).

Aachen is open all the year round; there is a summer season, from April 15 to October 15, and a winter season from November to April.

Access: In 11 to 12½ hours from London by Ostend or Calais and Verviers.

Accommodation: Very good. The patients can live in hotels or in the bath-houses themselves, the latter being very convenient during bad weather.

Doctors: G. Mayer, Schumacher, Thissen, Schmithuisen, Beissel, Müller, Schuster, M. Schroeder, A. Lieven, &c.

Burtscheid is practically a suburb on the south-east of Aachen, and the springs are similar; somewhat poorer in sulphur, and remarkable for their extreme heat and abundance. The temperature of the 'Kochbrunnen' is about 162° F., and there is another spring, whose temperature reaches 167° F.

Aix-les-Bains, or Aix in Savoy (France).—This famous spa, the 'Aquæ Gratianæ,' or 'Aquæ Domitianæ,' or 'Aquæ Allobrogum' of the Romans, is situated at an altitude of 860 feet, in the beautiful country of the Savoy Alps, to the east of the picturesque lake of Bourget.

The two chief springs, the 'sulphur spring' and the 'alum spring' (the latter however contains no alum), are poor in mineral constituents, but have a temperature of 109·5° to 112° F. and are very abundant; they are fairly rich in glairine and organic matter, and contain sufficient sulphuretted hydrogen to give them the

characteristic smell. The waters of these two springs are chiefly used for external application (douche-massage, Berthollet local vapour baths, &c.), but likewise for drinking.

For internal use, however, the stronger cold sulphur water of Challes (*q.v.*), containing minute quantities of the iodide and bromide of sodium, is sometimes used at Aix, but less than formerly. Challes is near Chambéry, and its water is brought to Aix in large vessels, and can be obtained at chemists in the town. At Marlioz, about ten minutes' walk to the south of Aix, is another cold sulphur spring, which is chiefly employed in chronic laryngeal and bronchial catarrhs in adults, and in tendency to bronchitis in delicate children. The inhalation and spray rooms at Marlioz have recently been renewed. The neighbouring feebly mineralised waters of Saint Simon (Department Savoie) likewise sometimes serve for internal use at Aix. They resemble the Evian waters.

The various methods of treatment employed at Aix-les-Bains are of service in cases in which indifferent thermal waters are of use, for chronic gouty and 'rheumatic' manifestations, rheumatoid arthritis, muscular rheumatism, sciatica, neuralgias, neurasthenic conditions in arthritic subjects, chronic cutaneous eruptions, and chronic catarrhal affections of the mucous membranes. For syphilis the principles of treatment are similar to those at Aachen.

Douches and baths are given by preference before breakfast or in the forenoon, and if mineral water is likewise taken internally, it is usually prescribed before or after the bath, or partly before and partly after, or else before meals. As drinking the waters at Aix plays a part quite secondary to the external treatment, the daily routine is somewhat different from that at the best known German spas, and there is no early morning promenade, with music, as at these spas.

The large bath establishment is the property of the

State, and is one of the most efficient of these institutions existing. Poor people are cared for, as well as the rich. There are separate simple thermal baths, and piscines for several people; thermal and cold douches; 'Berthollet' vapour baths for separate parts of the body; and chambers, known as 'bouillons,' in which the hot mineral water is used to form a vapour bath.

Aix is celebrated for the good results obtained in the stiffness of joints arising from former injuries and from gout and rheumatoid arthritis. The chief kind of treatment employed at Aix is said by Daquin (1808) to have been introduced from Egypt after Bonaparte's Egyptian campaign at the end of the eighteenth century. It has received the name of the 'Aix douche,' or better, 'douche-massage,' and consists in the methodical application by two skilled attendants of massage simultaneously with the douche. It may be used for the whole body (the head of course excluded), or be specially applied to the diseased part: the sort of massage or rubbing, and the strength and temperature of the douche, must of course be varied according to the individual case, and this treatment may be combined with passive movements of special joints. The 'Aix douche' is sometimes followed or preceded by a vapour bath in the adjoining 'bouillon.' At present there is not room at the establishment for patients to rest there after the treatment, but there will soon be additional accommodation for this purpose; in many cases they are carried by porters on chairs from their hotels to the bath and back again to bed after the bath. The daily application of the general douche-massage ordinarily lasts about ten minutes. After a few days' treatment an interval of rest, or of days in which a simple thermal bath is taken, is usually prescribed. The total number of applications which constitute a single course in most cases is about eighteen or twenty. By that time the maximum effect in regard to the excretion of toxic sub-

stances (see p. 49) should have been obtained.[1] The 'douche-massage,' after the method of Aix-les-Bains, has been introduced at several other French spas, and has likewise been adopted with success at Harrogate, Bath, and other places in Great Britain.

The Aix season lasts from April to November, but the bath establishment is open throughout the year. During the main part of the season there is no lack of amusement for patients. An 'after-cure' is often advisable, and for this purpose a stay on the neighbouring Mont-Revard (5,360 feet), up which there is now a rack railway from Aix, or in colder weather, at the less elevated Les Corbières (2,200 feet), may sometimes be recommended. Another neighbouring locality with limited but fair accommodation is the Col-du-Chat (2,090 feet), on the mountain above the lake of Bourget, *vis-à-vis* to Aix. The not very distant health resorts of Les Avants, Caux, and Glion are very convenient, being sunny, possessing a dry soil, and moderately bracing air.

Access: In 19 to 20½ hours from London; *viâ* Paris and Macon.

Accommodation: Very good.

Doctors: Vidal, Blanc, Forestier, Monard, Rendall, J. Dardel, Cazalis, Françon, Guilland, Guyenot, Linn, Klefstad-Sillonville, &c.

Harrogate (England, Yorkshire). — Harrogate, situated in a bracing district of Yorkshire, at an elevation from 260 to 600 feet above sea-level, is perhaps the most flourishing English spa, though probably not quite such a centre of fashion as Bath was in the eighteenth century. The lower town is much more sheltered than 'Upper Harrogate,' and not so bracing. The large common or 'Stray' assures the free access of fresh air to the houses and hotels which border it.

There are about eighty different mineral springs at Harrogate, and the strength and proportion of the

[1] For further details of the douche-massage see Forestier, *Le Traitement Thermal d'Aix-les-Bains*, 1895.

constituents vary greatly in the different waters. Most of them are cold muriated springs, containing sulphuretted hydrogen and sulphide of sodium. Of these the 'old sulphur spring' (Royal Pump Room) with about ·07 per mille of the sulphide of sodium and 37 volumes per mille sulphuretted hydrogen, is the one most generally preferred for internal use. It contains likewise 12·7 per mille common salt and ·09 per mille of chloride of barium; the latter substance, of which the amount is about the same as in the Llangammarch waters, is believed to exercise a tonic influence on the heart's contraction, counteracting any depressing effect of the sulphur. The strong sulphur 'Montpellier' spring is said to contain about ·2 per mille sulphide of sodium and no sulphuretted hydrogen. The Starbeck sulphur wells yield mild sulphur waters used for baths.

There are also muriated-chalybeate springs; of these the so-called 'Kissingen well' is said to contain ·13 per mille of carbonate of iron, about 1 per cent. of common salt, about 1·2 per mille chloride of calcium, and no chloride of barium, whilst the 'chloride of iron well' contains about ·19 per mille of the chloride of iron, ·16 per mille of the carbonate of iron, about 2·5 per mille of common salt, and about ·07 per mille of barium chloride.

The sulphate of iron water from the 'alum well' in the 'bog field' is interesting on account of its containing, roughly speaking, about 1 per mille each of ferrous sulphate (protosulphate), ferric sulphate (persulphate), aluminium sulphate, calcium sulphate, and magnesium sulphate. A little marsh gas or carburetted hydrogen occurs in some of the Harrogate springs.

The iron waters are useful in anæmia, but they have not the advantage of the free carbonic acid gas which the foreign springs of Spa, Schwalbach, &c. contain. Though strong sulphur waters should not be given in great anæmia, in some anæmic conditions sulphur treatment may precede the iron. It is supposed in these cases

that the sulphur stimulates the secretory action of the liver, kidney, and skin, 'clearing out the system,' and preparing it for the beneficial action of the iron. Pharmaceutical preparations of iron may be given in addition to the waters. The common salt of the waters has a favourable influence in anæmic and cachectic conditions and in bronchitic patients. The sulphur and chloride of iron waters are artificially warmed before being taken.

In the New Baths, Harrogate is provided with recent and elaborate appliances for baths, douches, &c. and there are special attendants for administering the 'Aix douche' after the manner of Aix-les-Bains (*q.v.*). These hydrotherapeutic processes are much employed in the chronic gout and rheumatoid arthritis, and in stiff joints resulting from old injury or non-tuberculous disease, &c.

Sulphur baths are likewise employed in chronic eczema and psoriasis, and syphilis can be treated at Harrogate after the Aachen methods.

The Harrogate season is from May to September, but the spa is open also at other times of the year.

Access: From King's Cross Station in about six hours.

Accommodation: Good.

Doctors: G. Oliver, A. S. and J. A. Myrtle, J. G. Black, and many others.

Askern Spa (England, Yorkshire).—Askern (altitude about 25 feet), a village with a railway station, six and a quarter miles north of Doncaster, is situated on a large plain, part of which is an imperfectly drained peat bog. It contains a pump room and baths attached to each of its four springs. The waters are alkaline earthy, containing sulphuretted hydrogen gas, and have a yellowish tinge, probably due to their origin in a peat bog.

Their action is diuretic, and they are usually taken cold for internal use to the amount of about half a pint, two or three times a day. For external use, the waters are artificially warmed.

They are employed in some forms of dyspepsia, and in chronic gouty and rheumatic affections.

Access: From King's Cross Station in about four hours.

Accommodation: Good.

Doctors: Hindle, Johnston.

Amongst other sulphur springs in England we may mention the following:—Gilsland Spa (Cumberland), beautifully situated on the River Irthing, about twenty miles from Carlisle, and possessing likewise chalybeate waters; Shap Wells, three miles from Shap, in Westmoreland; Nottington and Radipole near Weymouth (Dorsetshire); Croft Spa (Yorkshire), and Dinsdale-on-Tees or Low Dinsdale (Durham). The latter two places (three miles from each other) lie on the River Tees, on the border between the counties of Yorkshire and Durham, not far from Darlington.

Llandrindod Wells (Wales, Radnorshire).—Llandrindod (altitude of the upper portion 700 feet) possesses muriated waters, muriated-sulphur waters, and weak chalybeate waters. The bracing air of the neighbourhood contributes much to the good effect derived at the spa, especially to those 'run down' by town life. Llandrindod, although it possessed a local reputation for a long time,[1] has only recently developed into a flourishing health resort. It lies in the centre of an elevated plateau, and is protected towards the east by Radnor Forest. The soil, like that of the neighbouring spas of Llangammarch, Builth and Llanwrtyd, is clayey. Of this group of health resorts the upper part of Llandrindod, owing to its open situation and rather bare surrounding country, can doubtless claim the most bracing climate, Llangammarch coming next. The healthiness and good

[1] The first printed account of the waters is: *A Treatise on the Three Medicinal Mineral Waters at Llandrindod*, by D. W. Linden, London, 1756. Dr. Linden was a German physician who had already written on several English chalybeate springs, and in 1754 visited Llandrindod for a troublesome skin affection. It has been suggested by some that Llandrindod Wells might be the 'Balnea Silurea' mentioned by Pliny.

sanitation of Llandrindod are manifested by its low mortality.

The muriated waters of Llandrindod (3·4 to 4·8 per mille common salt, 1 to 1·4 chloride of calcium, ·04 to ·7 chloride of magnesium) are slightly laxative, and are useful in atonic cases of dyspepsia, in constipation, in some cases of chronic rheumatism, rheumatoid arthritis, gout, gouty glycosuria and commencing cirrhosis of the liver. In rheumatic and gouty patients their use is often combined with that of the sulphur waters, and in atonic conditions of the alimentary canal with that of the astringent iron waters.

The muriated-sulphur waters are weakly muriated springs, containing apparently 1 to 14 volumes per mille of sulphuretted hydrogen gas. They are useful in some irritable conditions of the alimentary tract, with a tendency to diarrhœa, in some chronic affections of the bladder, and in various cutaneous affections. The sulphur water can be useful, associated with the iron water, in scrofulous affections.

In 1896 a sulphur spring, recently discovered by Mr. T. Heighway, in the so-called 'Park Spa,' was analysed by Dr. H. Swete and Mr. R. Ross, who found that it was a fairly pure sulphur spring like that of Llanwrtyd, with hardly more than one per mille of solid constituents (chiefly common salt), and containing ·04 per mille calcium sulphide, and about 22 volumes per mille sulphuretted hydrogen gas.

The chalybeate spring in the 'Park Spa' (not the so-called 'chalybeate spring' near the lake, the genuineness of which has been called in question), in spite of the small amount of iron (·018 per mille of the carbonate) and lack of free carbonic acid gas, is said to be of use in anæmic conditions. The water of this spring contains also about 4 per mille common salt and 1 per mille chloride of calcium. The muriated water is sometimes given simultaneously with it.[1]

[1] At Llandrindod the muriated ('saline') water is taken usually about 7 to 8 A.M. before breakfast, sometimes to the sound of music as

There are arrangements also for baths and douches at Llandrindod.

The season is from May to October. A good locality for an after-cure is Lake Vyrnwy Hotel, about 1,000 feet above sea-level, six hours distant from Llandrindod, and twelve miles from the railway station of Llanfyllin.

Access: By railway, in about six hours from London.

Accommodation: Good. The Rock House Hotel has a lower and less bracing situation than the Pump House Hotel, but would be of service to many delicate persons requiring shelter from winds, especially during the earlier and later parts of the year, whilst during the hotter months the more bracing position of the Pump House Hotel is preferable for the majority of visitors.

Doctors: Bowen Davies, J. M. Evans, A. G. Greenway, S. Floyd.

Builth Wells in Brecknockshire has waters similar to those of Llandrindod. The muriated waters of Builth are, however, stronger than those of Llandrindod. According to Dr. J. Attfield's analysis (1891), the muriated water of Park Wells contains 12·5 per mille common salt and 3·5 per mille calcium chloride. The muriated water of the Glanne Wells has, as far as we know, not yet been properly analysed. The Glanne Wells and Park Wells are about half a mile from each other, and both about one and a half mile from Builth town. Builth is a pleasantly situated market town (altitude about 400 feet) on the Wye, in a broad sheltered valley. Here visitors can stay, since there is only limited accommodation at the Wells (Park Wells).

Doctor: Bennett (in the town of Builth).

Llanwrtyd Wells (Wales, Brecknockshire).—Llanwrtyd Wells, situated at 800 feet above sea-level, has a fairly tonic climate, but is more sheltered and less bracing than Llandrindod, to which it ranks second

at Continental spas. The sulphur water is taken in the forenoon or afternoon. The latter is given cold, but the former is often artificially warmed.

amongst Welsh spas. It possesses a fairly pure sulphur spring with a total of hardly more than one per mille solids (chiefly common salt) and said to contain 36 volumes per mille sulphuretted hydrogen. There is likewise a weak chalybeate spring, containing ·011 carbonate of iron.

The muriated water of Builth may likewise be obtained if required.

The season lasts from May to September. About July the place is much frequented by colliers from the Rhondda Valley.

Access: From Euston Station in about 6½ hours.

Accommodation: Good. Great improvements have been made recently at the Dolecoed Hotel, which lies close to the springs, in the pleasant Dolecoed Park, at the western and most sheltered part of the town.

Doctor: A. Morgan.

Strathpeffer (Scotland, Ross-shire).—Strathpeffer (altitude, 200 feet) lies sheltered in a valley, so that the climate is mild. The strongest of its older sulphur wells, now called the Morrison Well in honour of Dr. Thomas Morrison, one of the founders of the spa, is said to contain about ·02 per mille sulphide of potassium, ·007 sulphide of sodium, and about 40 volumes per mille of sulphuretted hydrogen. According to Dr. R. F. Fox the recently utilised Lady Cromartie Well is still more sulphurous. The chalybeate 'Saints' Well' is said to contain about ·035 per mille carbonate of iron. All the Strathpeffer waters are cold.

Patients are chiefly treated here for chronic gouty, rheumatic, and dyspeptic troubles, and for chronic cutaneous affections.

Although the internal use of the waters takes the first place at Strathpeffer, various kinds of baths, including sulphur, brine and peat baths, are employed, as well as ordinary hydrotherapeutic treatment. The usual time for drinking the water is in the morning about eight o'clock and half-past eleven. The spa is

open all the year, but the season is from May to October.

Access: From Euston Station (London) in 17 hours or more.

Accommodation: Good.

Doctors: R. F. and J. T. Fox, W. Bruce (Dingwall), Duncan, Mackay.

Moffat (Scotland, Dumfriesshire).—Moffat (altitude 400 feet) possesses weak sulphur and chalybeate springs. The situation is beautiful, and the waters, which are obtained some distance off, are found useful in cases of slight anæmia and debility, chronic cutaneous affections, &c.

Access: By train *viâ* Carlisle in about eight hours.

Accommodation: Satisfactory.

Doctors: Grange, Munro, Rutherford, &c.

Lisdoonvarna (Ireland, County Clare).—Lisdoonvarna (altitude, about 430 feet), the most popular spa in Ireland, possesses cold sulphur and weak chalybeate springs. The Gowlaun spring contains 5·5 volumes per mille of sulphuretted hydrogen gas. Chronic gouty, rheumatic, and dyspeptic troubles are treated, and some cutaneous affections. The climate is bracing. The season lasts from June to October.

Dr. E. D. Mapother (*Papers on Dermatology*, 1889, p. 91) points out that the benefit derived from a stay at Lisdoonvarna does not seem to be due solely to moderation in diet, for poor people, who are always forced to live moderately, likewise derive benefit from the place. Even in the case of poor people however alteration in diet and regimen might play a part.

Access: In about eight hours from Dublin; *viâ* Limerick to the railway station of Ennistymon; thence drive of about seven miles to the spa.

Accommodation: Satisfactory.

Doctors: F. Forster, Westropp.

Lucan (County Kildare) is pleasantly situated in the valley of the River Liffey, at an altitude of about 100

feet, eight miles to the west of Dublin, and possesses cold sulphuretted hydrogen waters, and satisfactory accommodation. It was a popular spa at the beginning of the present century. *Leixlip Spa*, higher up the Liffey, two miles west of Lucan, has weakly mineralised waters, with a faint odour of sulphuretted hydrogen. At one time the Leixlip waters were thought to be chalybeate, and were popular with the people of Dublin. The temperature of the spring was found by Dr. Mapother in 1875 to be 64° F.

Swanlinbar (or Swanlibar), a small village (altitude about 300 feet) in County Cavan, Ireland, possesses cold sulphur springs, which were fashionable in former days.

Ballynahinch (Ireland, County Down), 17 miles by railway from Belfast, possesses sulphur waters, having a good local reputation in Ulster. According to Dr. Andrews there are about 3·5 volumes per mille of sulphuretted hydrogen gas, in the lower well. See Flinn, *Ireland: Its Health-Resorts and Watering-Places.* Second edition, p. 159.

Weilbach (Germany, Prussian Province of Hesse-Nassau).—Weilbach is situated at an altitude of 440 feet, between Frankfurt and Wiesbaden, twenty-five minutes' drive from the railway station of Flörsheim. It possesses two mineral springs, the 'Schwefelquelle' and the 'Natronlithionquelle.'

The Schwefelquelle is a cold, weakly mineralised spring, containing, according to R. Fresenius, 5·2 parts sulphuretted hydrogen gas in 1,000 parts by volume of water. The water is used for drinking in the case of stout persons with a tendency to hæmorrhoids and enlargement of the liver. It is also used for bathing and inhalation, the latter in catarrh of the respiratory organs.

The water of the Natronlithionquelle, according to Fresenius, contains 1·2 per mille chloride of sodium, 1·3 per mille bicarbonate of sodium, ·009 per mille

bicarbonate of lithium; it may, therefore, be classed amongst the muriated alkaline waters, and is used in gouty conditions, and in some urinary complaints.

The season lasts from May 1 to the end of September. A good deal of research has been carried on at Weilbach to explain the action of sulphurous mineral waters. Amongst the Weilbach doctors who have contributed to the literature of the subject we may mention H. Roth, H. Stifft, and the present medical man, Dr. Stern.

Nenndorf (Prussia, Province of Hesse-Nassau).—Bad-Nenndorf (altitude 230 feet) lies near the village of Gross-Nenndorf in a wooded country not far from Hanover. Of its cold sulphur springs the 'Trinkquelle' (1 per mille sulphate of calcium and, according to Bunsen, ·06 per mille calcium sulphide, and 42 per mille volumes of sulphuretted hydrogen) is richest in sulphur, and is the only one used for drinking purposes.

The Rodenberg brine, containing 6 per cent. of common salt, with a trace of sulphuretted hydrogen, is conducted from Soldorf, to be used for bathing purposes at Nenndorf, and may be strengthened, if required, by the addition of 'Mutterlauge.' Sulphurous mud baths ('Schwefel-Moorschlamm-Bäder') and gas inhalations are likewise made use of in some cases.

Patients come to Nenndorf for chronic rheumatism, gout, cutaneous affections, catarrhal conditions of the respiratory organs, &c. The chief season is from May 15 to September 30.

Meinberg (Germany, in the Principality of Lippe-Detmold), one and a half hour's drive from the railway station of Detmold, lies at an altitude of 660 feet on the northern border of the Teutoburger Wald. It possesses several mineral springs, amongst which the most important are a cold earthy sulphur spring (23 volumes per mille sulphuretted hydrogen), used for baths, and a cold muriated spring with about 5·5 per mille common salt, which can be used internally. The carbonic acid gas which escapes

from the soil is used for gas-baths. Probably, however, the most important treatment at Meinberg consists in its sulphurous mud baths (Chapter III.). There are likewise earthy chalybeate springs rich in carbonic acid gas. The season lasts from May 20 to September 10. Scrofula, chronic rheumatism, gout, neuralgias, and gynæcological affections are treated at Meinberg.

Eilsen (Germany, Principality of Lippe-Schaumburg) lies in a pleasant valley (altitude 230 feet) protected from the north and east winds. Of its various cold sulphur springs, the Julianenbrunnen contains, according to R. Fresenius (1890), the greatest amount of solid constituents, two per mille sulphate of calcium, with about 34 volumes per mille sulphuretted hydrogen. Sulphur mud baths ('Schwefel-Moorschlamm-Bäder') and gas inhalations are likewise made use of. The nearest railway station (about one hour's drive) is Bückeburg, on the Hanover and Minden line. The season is May 30 to September 5.

Bentheim (altitude 800 feet) in Hanover is situated in a forest of oaks near the Dutch border. It possesses a cold earthy spring (1·3 per mille sulphate of calcium), containing sulphuretted hydrogen, and used for baths in chronic rheumatic affections, &c., often in connection with hydrotherapeutic treatment or massage. The waters can be employed for inhalation in catarrh of the respiratory passages.

Langensalza in Thuringia (Prussian Province of Saxony), at an altitude of 660 feet, possesses several cold sulphur springs, of which the strongest contains as much as 47 per mille volumes of sulphuretted hydrogen. The establishment is twenty minutes' drive from the railway station.

Wipfeld (Bavaria).—Near it is the Ludwigsbad, in a protected position, 715 feet above sea-level. The 'Ludwigsquelle,' a cold, earthy sulphur spring (1 per mille sulphate of calcium, 25 per mille volumes sulphuretted hydrogen), is used for drinking and in the preparation

of sulphurous mud baths ('Schwefel-Moorschlamm-Bäder'). There are likewise a weak earthy spring, and two weak chalybeate ones.

Kainzenbad or **Kanitzerbad**, a summer resort in the Bavarian Alps, close to the Tyrolese border, lies at an altitude of 2,460 feet, half an hour distant from the railway station of Garmisch-Partenkirchen. Besides the 'Gutiquelle,' a cold sulphuretted hydrogen spring, there are weak alkaline springs and a chalybeate water. Milk and whey cures, hydrotherapeutics, and moor baths can be employed. There is likewise accommodation to be had at the Alm-am-Eck, 4,400 feet above sea-level.

Abbach (altitude 1,140 feet) in Bavaria, about half an hour's journey by railway from Regensburg, possesses a weakly mineralised alkaline earthy spring, containing sulphuretted hydrogen. It was known as far back as the thirteenth century, and possesses local reputation in the treatment of hæmorrhoids, &c.

Langenbrücken (Germany, in the Grand Duchy of Baden), at an elevation of about 440 feet, is a station on the railway between Heidelberg and Karlsruhe. It contains weak cold sulphated sulphur springs used for hæmorrhoidal conditions, chronic catarrhs of the respiratory organs, and in the form of hot baths, douches, &c. for chronic rheumatic affections.

Reutlingen, in Würtemberg (altitude 1,110 feet), on the Echaz, a railway station nine miles east of Tübingen, possesses cold sulphur waters containing minute quantities of the bicarbonates of sodium and magnesium.

Bad Boll (Würtemberg) is prettily situated in the Filsthal, at an altitude of 1,340 feet, about four and a half miles to the south of the railway station of Goeppingen. Its sulphuretted hydrogen water was already known in the sixteenth century.[1]

Other German cold sulphur waters are those of SEBASTIANSWEILER (altitude 1,570 feet), in Würtemberg; HECHINGEN (altitude 1,540 feet), and TENNSTEDT (altitude

[1] There is also a Bad Boll (3,200 feet) near Bonndorf, in the Baden Black Forest, visited in summer for its climate and fishing.

700 feet), in Prussia; Bad Höhenstadt (altitude 1,120 feet), in Lower Bavaria. Landeck, in Prussian Silesia, has been placed in the indifferent thermal group (Chapter VI.)

Baden in Austria.—Baden, near Vienna (altitude 700 feet), pleasantly situated at the entrance of the Helenenthal, is very much frequented as a summer resort by the Viennese. The thermal earthy sulphur waters, known already to the Romans, have a temperature of 80·6° to 96° F., and are used more for baths than for drinking. According to Schneider (1830) the Ursprungsquelle contains about ·02 per mille sulphide of calcium.

There are large thermal baths for several persons, separate thermal baths, mud baths (local and general), and arrangements for hydrotherapeutic processes. There are, likewise, swimming baths, supplied with the mineral water.

Chronic gouty affections, rheumatoid arthritis, 'muscular rheumatism,' scrofula, and chronic skin eruptions are amongst the conditions treated here. When used internally (as in some cases of chronic bronchial and gastric catarrh), the water is mixed with milk or whey, or with the mineral water of another place. The chief season lasts from May 15 to October 15, but the baths are open during the whole year.

Access: From London with about 33 hours' travelling; from Vienna by train in an hour.

Accommodation: Good.

Doctors: J. Schwarz, Carl Schwarz, E. Raab, H. Raab, and many others.

Altenburg (or Deutsch-Altenburg), in Lower Austria, near Pressburg, contains a weak thermal sulphur spring, having a local reputation in cases of chronic cutaneous eruptions, &c. This bath (altitude 490 feet) was formerly called Hofbad, and was famous. In Roman times it was known as 'Thermæ Pannoniæ.'

Innichen (Austria, Tyrol).—The establishment,

'Wildbad Innichen,' is beautifully placed amidst forests at an altitude of 4,370 feet in a branch of the Pusterthal, three-quarters of an hour from the railway station of Innichen. There are two cold sulphur springs and a chalybeate one.

Alt-Prags (Austria, Tyrol), beautifully situated at an altitude of 4,500 feet in the Pragserthal, a branch of the Pusterthal, is one and a half hour distant from the railway station of Niederdorf. It possesses a weak sulphur spring used for bathing.

Längenfeld (Austria, Tyrol) is situated at an altitude of 3,820 feet, in about the middle of the Oetzthal, a picturesque valley branching out southwards from the Upper Inn valley. It possesses cold sulphuretted hydrogen waters.

Ladis (Austria, Tyrol) is picturesquely situated (altitude 3,900 feet) near the ruined castle of Ladis, on a height above the left side of the Upper Inn valley, two and a half hours distant from the railway station of Landeck. It possesses cold sulphuretted hydrogen waters. Obladis, a summer resort, situated about 650 feet above Ladis, has cold sulphur waters used for baths, and an acidulated spring used internally.

Hercules Bad (Hercules-Fürdo), near Mehadia, in Hungary (altitude 570 feet), lies in the romantic Czörna Valley, three miles from the Danube, and on the railway between Orsova and Temesvar. Its thermal waters (known from Roman times), with temperatures from 70° to 133° F., are mostly muriated sulphurous ones; they have been compared to those of Aix-la-Chapelle, and like them are employed internally and externally, but chiefly externally. The sulphur is contained in the form of sulphuretted hydrogen, one spring having about 42 per mille volumes, it is said; but the 'Hercules spring' is quite free from it, and has therefore been already mentioned in the chapter on muriated waters. The same affections are treated as at Aix-la-Chapelle.

The situation at the foot of the Carpathian Moun-

tains is very beautiful and much appreciated by the people of south-eastern Europe. The accommodation is good.

Season: May to the end of September.

Doctors: Popovich, &c.

Pystjan, or **Pistyan,** or **Pöstyen,** in Hungary, lies on the Waag at an altitude of 490 feet, fairly sheltered from the north and east by the Carpathians. The spa, which adjoins the town, possesses thermal sulphur waters (135°–146° F.) chiefly used for baths. Sulphurous mud baths, both general and local, are likewise employed. Rheumatoid arthritis, the results of injuries to bones and joints, and syphilis, are amongst the affections treated. Pystjan has a railway station on the Waagthal line.

Buda-Pest (see Chapter VI.) possesses thermal sulphur waters and excellent bathing arrangements.

Balf, in Hungary, is a village with mild climate, one mile from Oedenburg. It possesses two cold muriated alkaline sulphur springs, which are used by patients from the neighbourhood only.

Parad, in Hungary, contains a strong sulphuretted hydrogen spring. The spa has already been noticed amongst sulphate of iron waters. (See Chapter XII.)

Other Hungarian thermal sulphur waters are those of Trenczin-Töplitz, or Teplitz-Trentschin (99°–104° F.), with sulphur mud baths; Hajo, near Grosswardein (96°–111° F.); and Harkany (143–5° F.). In the waters of Harkany, Karl von Than discovered the inflammable gas, sulphide of carbonyl (COS), which is said to be present over the spring in a quantity sufficient to be ignited.

Warasdin-Teplitz, or **Warasdin-Töplitz,** in Croatia, three hours from the railway station of Csakathurn, lies at an altitude of 920 feet, in a pleasant position sheltered from the north. Its thermal sulphur waters (temperature 136·4° F.) are said to have been known to the Romans as the 'Aquæ Jasæ.' Their total of solid constituents is ·77 per mille.

Ilidze (Bosnia) is beautifully situated at an altitude of about 1,600 feet, eight miles from Serajevo, the chief town of Bosnia. Its thermal earthy sulphurous waters (temperature 124° F.) contain 1 per mille bicarbonate of calcium, 0·8 sulphate of sodium and 0·039 by weight sulphuretted hydrogen ; they have an old reputation for rheumatoid arthritis, &c.

Baden in Switzerland (Canto Aargau).—The spa (altitude about 1,230 feet), and the somewhat higher situated old-fashioned town of Baden, lie in a beautiful valley on the banks of the River Limmat. The position of the place is a fairly sheltered one, the climate is mild, and is influenced by the extensive forests surrounding the place. Its thermal weak sulphurous waters were known already to the Romans, and were famous in the Middle Ages, when the Papal Secretary, Poggio Bracciolini, described the gay nature of the spa-life here (1416).

The average temperature of the waters is 118·4° F.; they smell of sulphuretted hydrogen, and contain a certain amount of the sulphates and chlorides of calcium and sodium (total solids according to Müller, 4 per mille). Wagner detected a minute amount of arsenic in the Baden springs, and F. P. Treadwell in his recent analysis draws special attention to the presence of boric acid (borates). Owing to the earthy constituents the water of Baden is not much taken internally, but when this is advisable it may be mixed, as in some hæmorrhoidal cases, when a laxative effect is required, with the neighbouring Birmenstorfer bitter water, or in other cases, a little bicarbonate of sodium may be added.

The different hotels have their own baths, but there is likewise a separate establishment, which is used by certified poor patients of different countries. The cases treated at Baden include rheumatoid arthritis and articular troubles of a chronic rheumatic or gouty nature, as well as stiff joints resulting from injury, or previous peripheral neuritis. Others are treated for sciatica,

lumbago, 'muscular rheumatism,' and various affections on a gouty basis. The baths are usually given at a temperature of about 93° F., and the time preferred is before breakfast. When a more stimulating effect is desired, salt from the neighbouring Rheinfelden brine can be added. Massage is much employed for the joint affections, and for cases of sciatica and muscular rheumatism. Inhalation rooms are provided for use in chronic affections of the air passages.

The neighbourhood affords excellent ground for a 'terrain-cur' after Oertel's views. The season at Baden is from the middle of May to the end of September, but the spa remains open all the year. Owing to the waters being little drunk, there is no 'Kur-Musik' in the early morning before breakfast, and in this respect the ordinary daily routine differs somewhat from that at most of the well-known German spas.

Access: In about 21 hours, *viâ* Bâle.

Accommodation: Very good.

Doctors: Minnich, Röthlisberger, Borsinger, Keller, &c.

Schinznach (Switzerland, Canton Aargau).—Schinznach, a station on the railway from Zurich to Aargau, lies at an altitude of about 1,140 feet, in the pleasant valley of the Aar. The establishment is situated in grounds of its own, distinct from the village, and is likewise known as the 'Habsburger Bad,' from the ruins of Habsburg, which crown the neighbouring Wülpelsberg (1,680 feet).

The Schinznach spring yields a thermal strong sulphurous water, the temperature of which varies from 82·4° to 95° F.; according to Grandeau, it contains as much as 37 per mille volumes of sulphuretted hydrogen, with a moderate amount of gypsum (one per mille) like many other Swiss sulphur waters, and ·008 per mille sulphide of calcium. The thermal establishment affords good lodging, as well as baths for the patients; it is fitted up for the mineral water baths, vapour baths, and

ordinary baths ; also with apparatus for nasal and local douches, and for inhalation of the pulverised mineral water, and the gases given off.

Baths of long duration (1½ to 2 hours) are often prescribed, and the water has sometimes to be heated one or two degrees for bathing. The mineral waters of Schinznach are used both externally and internally. If taken internally it is recommended that as a rule the dose be taken before the bath.

The affections treated here are chronic eczema and other chronic skin eruptions (for which the spa has a special reputation), chronic gouty and rheumatic complaints, leucorrhœa, chronic catarrhal conditions of the respiratory organs, caries of bone, scrofula, rickets, and syphilis. Nasal douches, sprays, and inhalations are employed in naso-pharyngeal catarrh, bronchitis, asthma, and emphysema. In some scrofulous and cutaneous affections the muriated water of the neighbouring Wildegg (Chapter VII.), containing small quantities of iodides and bromides, is recommended for internal use. The season lasts from May 15 to the end of September.

Doctor : Amsler (of Wildegg).

Lavey (Switzerland, Canton of Vaud), 1¼ mile from the railway station of Saint Maurice, possesses weak thermal sulphur waters (temperature 92° to 118°), containing, according to Baup, 3·5 per mille volumes sulphuretted hydrogen gas, and 1·3 per mille solids (chiefly sulphate and chloride of sodium). The waters are used for drinking, bathing, and pulverisation. For baths the ' eau-mère ' of Bex (*q.v.*) may be added to the thermal water. The ' eau-mère ' is sometimes also employed internally, after filtration and suitable dilution with the thermal sulphur water. For aperient purposes a preparation, deprived of most of its chlorides, is used, and other special preparations of the ' eau-mère ' are made. Baths of a fine sand from the banks of the Rhone are employed, mostly in the form of local applications, at

temperatures of 113° to 130° F., and even higher. There are likewise arrangements for massage in the hot bath, the Aix douche-massage, hydrotherapy, and 'wave baths' in the river, which during the heat of summer is full, cold and covered with foaming waves. Lavey lies in the Rhone Valley at an elevation of 1,350 feet, between the right bank of the river and the rocky base of the Dent-de-Morcles, which shelters it to the east and north. The establishment, hotel, and a small hospital for poor patients stand by themselves away from any village or factory. The affections treated at Lavey comprise scrofula and rickets in children, chronic rheumatism in adults, chronic cutaneous affections, &c.

Doctor: Suchard.

Yverdon (Switzerland, Canton Vaud) is situated (altitude 1,420 feet) at the southern extremity of the Lake of Neuchâtel, on the railway between Lausanne and Neuchâtel. Its sulphur water (temperature 75° F.) is feebly mineralised (according to Bischoff the total of solids is 0·4 per mille), and contains 3·4 per mille volumes of sulphuretted hydrogen. The thermal establishment contains arrangements for pulverisation and inhalation treatment, and for douches, massage, &c.

Lenk, or **La Lenk** (Switzerland, Canton Bern), is situated on flat ground near the northern end of the Upper Simmenthal. By misprints in the word it has sometimes been confused with Leuk (see Loèche-les-Bains) in Canton Valais. The establishment (3,630 feet) is about ½ mile from the village, in a slightly more elevated and sheltered position, on the western side of the valley at the base of the Hohliebe; it commands a magnificent view of the rocky ridges and glaciers of the Wildstrubel Mountain, which shuts in the valley to the south.

Lenk possesses two cold gypsum sulphur springs, the Hohliebquelle, the one first known, and the much stronger Balmquelle, which is said to be the strongest sulphur spring in Switzerland. The latter arises at some distance

above the establishment, to which its waters are conducted in pipes; according to the analysis (1876) of Müller and Schwarzenbach, it contains 44½ per mille volumes of sulphuretted hydrogen gas, and 1·6 parts per mille gypsum. A weak, cold, non-gaseous, gypsum chalybeate spring (·01 per mille bicarbonate of iron) is sometimes employed at meal times.

According to De la Harpe the mean temperature for the four summer months is 59·5° F., and there is not as great a difference between the evening and day temperatures as at many other Swiss localities of the same altitude; the greater warmth of Lenk is partly attributed to the stillness of the atmosphere and the radiation from the surrounding mountains heated during the day-time. The adjacent pine forest affords the protection often needed from the mid-day sun.

Chronic catarrhal conditions of the throat and respiratory organs are amongst the affections most frequently seen at Lenk. The sulphur water is usually warmed for drinking and inhalation, and pulverisation treatment is much employed. Baths of the warmed sulphur waters are used in skin affections, amongst which Dr. Jonquière specially mentions eczema and furunculosis. The season is from June 15 to September 30. Owing to its position and altitude Lenk is suitable in many cases as a simple climatic station, and for an after-cure after courses of mineral waters at other spas.

Access: The railway station of Thun is about 8 hours (34 miles) distant by diligence.

Accommodation: Good.

Doctor: Jonquière.

Gurnigel (Switzerland, Canton Bern).—The establishment, including the capacious hotel (altitude about 3,780 feet), lies high up on the northern slope of the Gurnigel Mountain, adjoining an immense forest of pine trees, and commanding an extensive view towards the Jura Mountains on the north. Its cold strong sulphur spring, 'Schwarzbruennli,' contains, according to De

Fellenberg, 1·3 per mille sulphate of calcium, ·004 per mille sulphide of calcium, and ·001 per mille sulphide of magnesium, with 35 per mille volumes of sulphuretted hydrogen gas (39 volumes according to Müller). The 'Stockquelle' water, employed therapeutically since the sixteenth century, contains less sulphuretted hydrogen.

The climate is sunny, and, owing to the open position, bracing; there are numberless beautiful walks with protection from sun and wind in the adjacent pine forest, and the accommodation is excellent. The establishment lies by itself, and there are no villages or factories in the neighbourhood to affect the purity of the air and make it dusty. In case of bad weather the extensive covered galleries can be made use of as promenades.

Gurnigel, according to Verdat's statistics, has a special reputation in cases of dyspepsia and chronic catarrhal conditions of the stomach and digestive organs. The season is from June to September. The railway station of Bern is 5 hours distant by diligence.

Doctor: Barbey.

Schwefelberg, 2½ hours distant from Gurnigel, has similar gypsum sulphur waters, but lies at a somewhat higher altitude (4,570 feet).

Heustrich (Switzerland, Canton of Bern).—The establishment (altitude 2,300 feet) lies on the left bank of the Kander, at the eastern foot of the Niesen Mountain; it is quite apart from villages and factories, and towards the south commands a view of the Blümlisalp with its dazzling covering of glacier and snow.

The cold sulphur waters contain, according to Müller's analysis, 0·3 per mille sulphide of sodium, and 11 per mille volumes of sulphuretted hydrogen, in association with small quantities of the bicarbonate (·6 per mille) and sulphate of sodium. They differ from the neighbouring waters of Gurnigel in their smaller total of solid constituents (just under one per mille), and in not containing any sulphate of calcium. Those of the patients who are strong enough to walk to the source, which is

about ¼ hour distant above the establishment, drink the water where it arises; it is, however, always to be obtained in bottles at the establishment.

The somewhat high mean relative humidity of the atmosphere is an advantage in irritable affections of the larynx and respiratory passages, for which treatment by pulverisation of the mineral water is provided. There is a compressed air chamber, which can be used in emphysema and chronic bronchitis, when the heart and circulatory system are tolerably sound. Next to the chronic catarrhal affections of the respiratory organs, come the cases of catarrhal dyspepsia treated at Heustrich, and amongst cutaneous diseases Neukomm draws special attention to the use of the baths in some cases of furunculosis. Treatment by hydrotherapy, massage, and milk cures can be employed in suitable cases. The season is from the commencement of June to the end of September.

Access: Heustrich is 2 hours by carriage from the railway station of Thun, and 40 minutes by omnibus from Spiez, a steamboat and railway station on the Lake of Thun, between Thun and Interlaken.

Accommodation: Good. The hotel forms part of the establishment.

Doctor: Neukomm.

Schimberg (altitude 4,670 feet), in the Canton of Lucerne, possesses similar waters to those of Heustrich, but containing rather less sulphur. The establishment, which is visited by patients with chronic affections of the respiratory organs, &c., is situated on the western slope of the Schimberg Mountain, by which it is protected from north-east winds, though the south-west and south winds are sometimes violent. For baths the water of another spring (which is termed chalybeate) is employed.

Lostorf (Switzerland, Canton Solothurn) lies at an elevation of 1,640 feet, on the southern declivity of the Jura, 1¼ hour by carriage from the railway station of Olten. It possesses a cold muriated sulphur spring,

which, according to Bolley, contains sulphide of potassium, sulphuretted hydrogen, and 3 per mille common salt. There is likewise another spring, similar but weaker, and a gypsum water resembling that of Weissenburg but colder.

Alveneu, or **Alvaneu** (Switzerland, Grisons), lies at an elevation of 3,150 feet above the sea-level, in the Albula valley, not far from Tiefenkasten. The establishment can be reached by diligence from Chur, Thusis, or Davos, or over the Albula pass from the Engadine. It possesses a cold gypsum sulphur spring, containing, according to Planta-Reichenau (1864), about 1 per mille sulphate of calcium and very little sulphuretted hydrogen; this water is used in chronic rheumatic and gouty affections, catarrh of the respiratory organs, &c. In the neighbourhood are the sulphated alkaline chalybeate springs of St. Peter at Tiefenkasten, or Tiefenkastell (according to Planta, 2·2 per mille sulphate of sodium, 1·7 per mille bicarbonate of calcium, and ·029 per mille bicarbonate of iron), and of St. Donatus at Solis; the latter contains a small amount of iodide (·001) and bromide (·002) of sodium. These waters might be employed internally at Alveneu in some chronic catarrhal conditions of the digestive organs in weak subjects. The season is from June 15 to September 25.

Doctors: Schnoeller, Schmid.

Le Prese in Switzerland (Canton Grisons) is a summer resort on the Lago di Poschiavo, 3,160 feet above the sea-level, half an hour's drive from Poschiavo, and about six hours' drive from Samaden. The cold sulphur waters are feebly mineralised (total solids according to Wittstein, 0·3 per mille), and contain 6 per mille volumes of sulphuretted hydrogen; they are used for baths and for drinking. The bath arrangements and accommodation are satisfactory. The season is from the commencement of June to the end of September.

Serneus (Switzerland) in the Grisons has a cold sulphur spring with about 9 per mille volumes of

sulphuretted hydrogen gas. The establishment lies at an altitude of about 3,240 feet in the Praetigau valley on the branch railway from Landquart to Davos.

Stachelberg (Switzerland, Canton Glarus), near the railway station of Linththal, possesses a cold sulphur spring, containing rather little sulphuretted hydrogen, but, according to an old analysis of Simmler, ·04 per mille sulphide of sodium. By its climate and beautiful position in the Toedi district, 2,050 feet above sea-level, it offers considerable advantages.

Other Swiss cold sulphur waters are those of Montbarry (altitude 2,460 feet) in the Gruyères district of Canton Freiburg; L'Étivaz (altitude of the small establishment 4,100 feet) near Château d'Oex in Canton Vaud; Fluehli im Entlebuch (altitude 2,930 feet) in Canton Lucerne; and Rietbad (altitude 2,790 feet) in the Toggenburg district of Canton St. Gall.

Eaux Chaudes (France, Basses-Pyrénées).—The village is situated in the rocky prolongation of the Ossau valley (altitude 2,050 feet) three miles from the railway station of Laruns and five miles by the road from the spa of Eaux Bonnes.

The thermal springs have a temperature of 77°–97° F., and are similar in their mineral constituents to those of Eaux Bonnes, but contain less sulphur (sulphide of sodium ·0088; total solids ·33 per mille).

The waters (contrary to those of the neighbouring Eaux Bonnes) are employed chiefly for baths and douches (including vaginal and rectal douches). The different springs from old tradition have reputations for different affections; the 'Source Clot' for arthritic affections, the 'Source Esquirette' for uterine troubles, &c., the 'Source Rey' for nervous disorders in rheumatic subjects, and the 'Source Baudot' (temperature only 77° F.) for catarrhs of the respiratory organs.

The waters of Eaux Chaudes have a less excitant action than the hotter Pyrenean sulphur waters, but have, it is said, a tendency to produce hyperæmia of the

pelvic organs, and thereby aid in the re-establishment of the menses in chlorotic girls. The spa is chiefly resorted to by women suffering from chronic disorders of the pelvic organs.

There is likewise a cold spring, the 'Source Minvielle,' analogous to the 'Source Froide' at Eaux Bonnes. With the sulphur removed this spring is used as a table water.

A pleasant excursion from Eaux Chaudes is that to the village of Gabas, about five miles higher up the valley (southwards). Patients have not so much facility for shady walks as they have at Eaux Bonnes.

Season: June 1 to October 1.

Access: By omnibus or carriage from the railway station of Laruns.

Accommodation: Fair.

Doctor: Verdenal.

Cambo (France, Basses-Pyrénées) is situated in the valley of the Nive, amidst beautiful scenery, at an altitude of about 200 feet above sea-level. It possesses a gypsum water (72° F.), containing a little sulphuretted hydrogen, and a cold chalybeate spring. There are pleasant walks and interesting excursions to be made in the neighbourhood. Owing to the mildness of its climate Cambo is likewise used as a winter climatic resort. The establishment is open throughout the year. The railway station is forty minutes distant from Bayonne.

Saint-Boès (France, Basses-Pyrénées), according to Dr. F. Garrigou,[1] possesses the most sulphurous water in the Pyrenees (exported only). This water is cold and bituminous, and contains sulphide of sodium and sulphuretted hydrogen, equivalent to ·156 per mille sulphide of sodium. Garrigou speaks of its utility in affections of the respiratory and intestinal mucous membranes, and has obtained good results from its use in cases of pulmonary tuberculosis.

Barèges (France, Hautes-Pyrénées).—This celebrated

[1] *Le Bulletin Médical des Stations Pyrénéennes*, December, 1894, p. 47.

spa lies in the upper, rather bare part of the valley of the Gave de Bastan, at an elevation of 4,200 feet above the sea-level; in summer warm clothing should be brought, and the place is hardly habitable during winter. The waters are thermal sulphurous (temperature 81°–111° F.), and do not whiten on exposure to the air as do those of Luchon; they contain an organic substance which forms a scum on the surface, and was named by Longchamp 'Barégine' after this spa. The hotter springs are the richest in sulphide of sodium. In courses of baths the tepid baths are used to begin with, and then gradually the hotter ones (sometimes up to 100·5° F.). Local douches are employed sometimes up to 111° F. The hot waters have a powerful nervous excitant action.

Barèges has a very great reputation in the treatment of old gun-shot and other wounds, painful cicatrices, and chronic joint affections; there is a large sanatorium for officers and soldiers. Chronic eczema and psoriasis are said to be at least temporarily benefited. Barèges is also resorted to by sufferers from syphilis. The spa became famous in 1675 when the Duc du Maine, natural son of Louis XIV., was treated with good result for a tuberculous affection. Internally used, the waters sometimes give rise to nausea and diarrhœa; they are somewhat less employed for drinking than for bathing. The 'Tambour' spring (temperature 111° F.), which contains ·04 per mille sulphide of sodium (and a minute quantity of arseniate of sodium), is the only one used internally, and is taken in small doses, often mixed with milk or whey.

The season lasts from June 15 to September 15.

Access: Two and a half hours' drive from the railway station of Pierrefitte. (See under Cauterets.)

Accommodation: Moderate.

Doctors: Grimaud, Bétous, Bergeret.

Barzun, a spring, one quarter of a mile below Barèges, has water similar to the Barèges waters (temperature

84°). In 1881 the water of Barzun was conveyed by a conduit four miles down the valley to Luz, a village situated at an altitude of 1,790 feet, one and a half hour's drive from the railway station of Pierrefitte, and only three-quarters of a mile distant from the spa of St. Sauveur. There are now two bath establishments, the old one at the source and the new one at Luz. The Barzun waters are less excitant than the hotter Barèges waters, but more excitant than the St. Sauveur 'Source des Dames.'

Saint Sauveur (France, Department of Hautes-Pyrénées).—The village is situated in one of the most picturesque valleys of the Pyrenees, at an altitude of 2,500 feet, on the Gave de Gavarnie, which joins the Cauterets Gave at Pierrefitte. There are interesting excursions to be made, but patients have not much variety in walks immediately around the spa.

The 'Source des Bains' or 'des Dames' (temperature 94°) supplies the bath establishment and contains about ·02 per mille sulphide of sodium (and a trace of arsenic). The other spring, the 'Source de la Hontalade' (temperature 86°), a few minutes' walk from the village, contains slightly less sulphide, and has a special reputation in cases of gastralgia, like the Mauhourat spring has at Cauterets.

St. Sauveur may be called a 'ladies' spa,' and is mostly used for gynæcological affections and functional nervous disorders.

The baths, which exercise a sedative influence on the nervous system (contrasting with the excitant action of the Barèges baths), produce a special stimulant or tonic action on the uterus, and sometimes provoke, the local doctors say, a 'hydrorrhœa from thermal treatment.' The St. Sauveur treatment is suitable to patients of an irritable or erethic tendency.

The establishment of Barzun at Luz can be likewise made use of by patients resident at St. Sauveur, for it is only three-quarters of a mile distant.

Season: June 1 to October 1.

Access: About one and a half hour's drive from the railway station of Pierrefitte. (See under Cauterets.)

Accommodation: Satisfactory.

Doctors: Cauley, &c.

Bagnères-de-Bigorre (France, Hautes-Pyrénées) possesses the sulphur waters of Labassère in addition to its other waters. The spa is described amongst earthy waters in Chapter XV.

Cadéac (France, Hautes-Pyrénées) is picturesquely situated at an altitude of 2,360 feet, two miles to the south of Arreau. It possesses cold sulphur waters, almost the strongest in the Pyrenees, containing ·075 per mille sulphide of sodium. Arreau is about half-way on the well-known road between Bagnères-de-Bigorre and Bagnères-de-Luchon; it will probably be connected by a branch line with the railway between Bayonne and Toulouse. The sulphate of iron water of Le Moudang (·03 per mille) is sometimes made use of at Cadéac.

Argelès-Gazost (France, Department Hautes-Pyrénées).—Argelès (or Argelès-de-Bigorre) lies at an altitude of 1,520 feet in a broad part of the valley of the Gave de Pau. It is sheltered by an almost complete amphitheatre of mountains. The luxuriance of the vegetation, the fragrance of the air, and the magnificent view on to the Pyrenees, constitute a charm which, with the excellent accommodation, attracts visitors to Argelès in spite of the summer heat.

The recently erected bath establishment is supplied by cold sulphur water conducted from Gazost, ten miles distant. According to Willm's analysis of 1890, the Grande Source of Gazost contains ·01 per mille sulphide of sodium and ·02 per mille sulphide of calcium, whilst the Source Noire contains ·02 per mille sulphide of sodium and ·01 per mille sulphide of calcium. Both waters can be given internally, but the latter (brought only in bottles from Gazost) is said to be the best. They are employed in chronic catarrhal conditions of the throat

and respiratory organs, and in some gynæcological affections, where much excitation is not desired.

Argelès is very hot during the season (June 15 to October 1), but during spring many English who have wintered at Pau or Biarritz rest here for some time before proceeding to pass their summer in Switzerland or England.

Access: Argelès is a station on the line from Lourdes to Pierrefitte.

Accommodation: Excellent.

Doctors: Dutauzin (during the summer season only), Trelaün, Labit, Cénac.

Ax-les-Thermes (France, Department Ariège) is pleasantly situated, at an altitude of 2,340 feet, in the upper part of the Ariège valley. Owing to the mountainous position its climate is somewhat changeable and it may become cold in the evenings. The so-called Lepers' Bath (Bassin des Ladres) is said to date from 1260, in the reign of Saint Louis.

There are about sixty thermal springs, with temperature varying from 65° to 171·5° F., and mostly containing ·01–·026 per mille sulphide of sodium. The so-called 'degenerated sulphur' waters of Ax, in which the sulphide of sodium has been converted into the hyposulphite and sulphate, may practically be regarded as slightly alkaline simple thermal, or weak earthy waters; they exercise a sedative action, whereas a stimulating action is claimed for the Ax waters in which the sulphur persists as sulphide of sodium.

The Ax waters are used for drinking, baths, douches, inhalation, and hot vapour baths. Owing to the abundant supply and different temperatures and chemical composition of the waters, the balneotherapeutic resources of Ax are more varied than those of most other Pyrenean spas. In time Ax will probably become more widely known. It is visited for rheumatoid arthritis and chronic rheumatic affections, 'torpid' scrofulous condi-

tions, chronic affections of the respiratory organs, skin diseases, syphilis, &c.

The season is from May 15 to October 30.

Access: Ax is the terminus of a railway from Toulouse.

Accommodation: Satisfactory. Rooms may also be obtained at the Teich Bath establishment.

Doctors: Dresch, Palenc, &c.

Amélie-les-Bains, France (Pyrénées-Orientales), was called Bains-près-d'Arles until 1840, when it was renamed in honour of the wife of Louis Philippe. This spa is situated at an altitude of 920 feet, in a valley shut in by mountains, and although, owing to this fact, in winter the sun shines for a comparatively short time in the day, the winter climate is mild and the mean winter emperature about 46° F. The spa is open all the year round, but on account of the heat is mostly visited during the winter season. The east wind is sometimes disagreeable in spring (the worst time of the year for this spa).

The various springs yield alkaline sulphur waters, which have a temperature of about 140° F., and contain about ·016 per mille of sulphide of sodium. They are rich in glairine and organic matter. The Romans made use of the waters, and one of the two civil bath establishments is erected on the foundations of ancient Roman thermæ.

The baths are used for skin affections, rheumatoid arthritis, pain in old wounds, &c. and treatment by various hydrotherapeutic appliances may be added. The waters are likewise employed in chronic catarrhal conditions of the respiratory organs, for which the mild climate of the spa is tolerably suitable during the winter months. Drinking the waters is recommended in some disorders of the liver and digestive system. There is a large military hospital with baths of its own.

Access: Railway to Perpignan and on to Céret; thence a six miles' drive. The railway is being extended from Céret to pass Amélie-les-Bains, where there will be a station

Accommodation: Moderate. Patients can pass from their hotels to their baths without exposing themselves to the open air.

Doctors: Pujade, Arnal, Picard, &c.

Vernet-les-Bains or **Le-Vernet** (France, Pyrénées-Orientales), a pleasant spa with excellent bath arrangements and shady promenades, lies at an altitude of about 2,060 feet, in a southern branch of the Tet valley at the northern foot of the Canigou Mountain. It possesses thermal sulphur springs (90° to 154° F.), containing sulphide of sodium, up to about ·04 per mille; the waters are employed for drinking, baths, douches, sprays and inhalation. There are also small thermal swimming baths. Patients resort to Le Vernet for chronic affections of the respiratory organs, chronic rheumatism, cutaneous eruptions, &c.

The chief season is in the summer, but one of the bath establishments is open throughout the year. Dr. Ch. Sabourin founded a winter sanatorium ('Sanatorium du Canigou') for cases of pulmonary tuberculosis, opened in 1890.

Access: Vernet is 3½ miles (fifty minutes by omnibus) from Villefranche-de-Conflent, the terminus of a railway from Perpignan.

Accommodation: Excellent.

Doctors: Massina, Damezan.

La Preste (France, Pyrénées-Orientales) is a village situated at an altitude of 3,660 feet, about 20 miles from Amélie-les-Bains, and about 4¾ hours by the diligence from Céret, the nearest railway station. Its thermal sulphur waters (temperature 88° to 111° F.) decompose rapidly on exposure to the air. They become alkaline, 'degenerated' sulphur waters, have a diuretic action, and are used in chronic catarrh of the urinary organs, and in uric acid gravel.

Olette (France, Pyrénées-Orientales) lies in the valley of the Tet, not far from Vernet-les-Bains. It possesses a great number of thermal sulphur springs

(temperature 90° to 172° F.) containing ·001 to ·03 per mille sulphide of sodium. The bath establishments (Thuez and Canaveilles) are situated about two miles from the village, at an elevation of 2,300 feet above the sea, and about an hour by omnibus from the railway station of Villefranche-de-Conflent.

Molitg (France, Pyrénées-Orientales) lies at an altitude of about 2,000 feet, in the valley of the Tet, about six miles from Le Vernet. It possesses several alkaline sulphur springs having temperatures varying from 89° to 100·5° F., and containing from ·003 to ·018 per mille sulphide of sodium. Their chief reputation is in the treatment of skin diseases.

Les Escaldas (France, Department of Pyrénées-Orientales) is situated close to the Spanish frontier on a plateau, about 4,430 feet above the sea-level. The waters are thermal, and contain sulphide of sodium. The temperature of the 'Grande Source' is 109·5° F.

Uriage (France, Department Isère).—Uriage, about eight miles from Grenoble, lies at an altitude of 1,350 feet in a beautiful valley of the Dauphiné Alps. The thermal muriated sulphur spring (temperature 81° F.) has a total solids of 9·7 per mille, and, according to Willm (1888), contains 6 per mille common salt, about 1 per mille each of sulphate of sodium and sulphate of calcium, ·48 per mille sulphate of magnesium, and ·0001 per mille arsenic (as arseniate). The sulphuretted hydrogen gas present is equivalent to about 7 volumes per mille. In doses of from four to six glasses a gentle laxative effect is usually obtained, and is in many cases sought for at intervals during a course of treatment.

Uriage is of use in chronic cutaneous affections (eczema, psoriasis, &c.), disorders of the female pelvic organs such as are more particularly connected with disturbance of the general nutrition, and in various chronic scrofulous and rheumatic conditions. For baths and douches the thermal water can be heated to the required temperature, and the bath arrangements at the establish-

ment are excellent. Massage is frequently combined with the douches, as in the 'douche-massage' of Aix-les-Bains; at Uriage, however, the patient lies on an inclined table during the treatment, which is applied (about 12–15 minutes at a time) by one attendant only; the douche is often given alternately warm and cold. Treatment for syphilis is similar to that at Aachen.

The thermal water is likewise used for pulverisation, gargling and nasal douches. Ordinary water supplies the new hydrotherapeutic department.

In the neighbourhood of the establishment, close to the remains of the Roman thermæ, is a practically non-gaseous chalybeate spring (0·02 per mille bicarbonate of iron), which is sometimes employed internally in anæmic cases.

Uriage is a modern health resort remote from towns and factories. The pureness of the air, the luxurious vegetation of the valley, the beauty of the scenery and the shady walks in the surrounding woods must contribute largely to the good effects obtained. The old Château of Uriage, to the owners of which the spa owes its foundation and present development, is perched on an eminence, 300 feet above the establishment, and adds considerably to the picturesqueness of the neighbourhood. The season is from June to October.

Access: The station of Gières on the railway between Grenoble and Chambéry is about an hour's drive from Uriage. There is likewise a special steam-tramway from Grenoble to Uriage.

Accommodation: Good.

Doctors: Doyon, &c.

Allevard (France, Department Isère) possesses cold sulphuretted hydrogen waters, containing about one half per mille of common salt and about the same amount of sulphate of sodium. The amount of sulphuretted hydrogen is said to be 24 volumes per mille. The waters are used for drinking and for pulverisation and inhalation in cases of chronic catarrhal conditions of the throat, nose and

respiratory organs. A 'milk-cure' or a 'whey-cure' is employed in some cases. There are likewise arrangements for baths, douches, 'douche-massage,' and vapour baths, so that chronic skin diseases and various chronic rheumatic affections can be treated. Allevard is situated on the banks of the Bréda stream in a pleasant valley at an elevation of about 1,400 feet above sea-level. The thermal establishment was rebuilt in 1893, and is satisfactory, though the town itself has a somewhat squalid appearance, and there is a rather noisy factory close to the baths. The arrangements for inhaling the pulverised water or the gases and vapour from the water are especially to be noted. The season lasts from June to September. Allevard is about six miles from Goncelin (omnibus in 1½ hour), and is connected by a steam-tramway with Pontcharra (8 miles distant); both Goncelin and Pontcharra are on the railway between Grenoble and Chambéry.

Doctors: Révillet, &c.

Challes (France, Department Savoie), about three miles by steam-tramway from the railway station of Chambéry, lies at an altitude of about 880 feet, in a valley sheltered from north and east winds. It possesses strong cold sulphur waters, which are likewise supplied (for internal use) at Aix-les-Bains (*q.v.*). The total mineralisation of the water is 1·3 per mille, and the quantity of sulphur, reckoned as sulphide of sodium, is said to be ·5 per mille; small quantities of iodide of sodium (·01 per mille) and bromide of sodium (·003 per mille) are likewise contained according to Willm's analysis.

The water is used for drinking, and for nasal douches, pulverisation, &c. in cases of chronic catarrhal conditions of the throat and pharynx, in ozœna, adenoid vegetations, and chronic bronchitis. Baths can be employed in some cases of scrofula, syphilitic cachexia, &c. Adjoining the establishment is an old château which has been transformed into an hotel for those undergoing the

treatment. It is a fair distance off the high road, which is often terribly dusty. The season is from June to the commencement of October.

Doctors: Raugé, &c.

Gréoulx (France, Department of Basses-Alpes) lies at an altitude of 1,140 feet, about one and a half hour's distant from Mirabeau, a railway-station on the line from Grenoble to Marseilles. Its thermal muriated sulphur water contains about 2 per mille common salt, and is used for baths at its natural temperature of 97° F.

Digne (France, Basses-Alpes; alt. 1960 feet) has thermal muriated sulphur waters, similar to those of Gréoulx.

Bagnols (France, Department of Lozère) lies in the narrow valley of the river Lot, at an altitude of about 2,600 feet, and is 23 miles distant from the railway station of Villefort. It possesses thermal weakly-mineralised springs (temperature 95° to 106° F.), containing about 1·7 volumes per mille of sulphuretted hydrogen. The waters are employed for drinking, for hot baths, and for inhalation.

Good results are claimed at Bagnols in chronic rheumatism and skin diseases, and also in some chronic cardiac affections. At all events, it was long ago shown at this spa that thermal baths might be taken without harm, and in some cases with advantage, by patients suffering from chronic [rheumatic] affections of the cardiac valves, without loss of compensation. [See J. E. Dufresse de Chassaigne, 'Mémoire sur le traitement et la guérison de l'anévrysme rhumatismal du cœur (endocardite rhumatismale chronique) sous l'influence de l'usage des eaux thermales de Bagnols,' Angoulême, 1859.]

Saint Honoré-les-Bains (France, Department of Nièvre).—Saint Honoré is pleasantly situated, at an altitude of 990 feet, in a hilly and well-wooded country, at the western foot of some outlying elevations of the Morvan range, which shelters it from the east and north-east. It is about 32 miles east of Nevers.

Its tepid waters (temperature 72° to 88° F.) were known to the Romans, and contain a little sulphuretted hydrogen gas and some arsenic. Their total mineralisation is only about ·67 per mille. They are slightly alkaline, and have hardly any smell of sulphuretted hydrogen. According to the analysis of Personne in 1880, and of Parmentier in 1894, the 'Source de la Crevasse,' that mostly chosen for drinking, contains an amount of arsenic equivalent to about ·004 per mille arseniate of sodium.

The thermal establishment, situated in a park, contains baths, douches, pulverisation and inhalation chambers, rooms for gargling, hot vapour baths and a swimming bath. Douches for the feet are much employed at St. Honoré, sometimes to follow the inhalation of the waters.

St. Honoré is resorted to for chronic affections of the respiratory organs, chronic rheumatism, scrofula, and chronic cutaneous eruptions.

Season: May 15 to October 1.

Access: St. Honoré is about six miles (one hour by omnibus) from the railway station of Vandenesse, on the line between Cercy-la-Tour and Clamecy.

Accommodation: Good.

Doctors: Eugène Collin, Marius Odin, Binet, Breuillard, Comoy, Comte.

Enghien (France, Department of Seine-et-Oise) is a small town (altitude 160 feet) close to Paris. It possesses cold sulphuretted hydrogen springs (containing also ·023–·029 sulphide of calcium) and well-arranged establishments. The waters are used for drinking, bathing, douches, inhalation, pulverisation and gargling.

Pierrefonds (France, Department of Oise).—This little town, celebrated for its feudal castle, rebuilt by Viollet-le-Duc for Napoleon III., stands at an altitude of 275 feet on the side of a small lake below the hill on which the castle rises, at the southern border of the forest of Compiègne. Its cold sulphur spring contains

·015 per mille sulphide of calcium, small quantities of earthy salts, and 1·4 volumes per mille sulphuretted hydrogen. The waters are especially used in chronic affections of the respiratory organs. Treatment of chronic pharyngitis, &c., by pulverisation with the sulphur waters was employed at Pierrefonds as early as 1856.

There is also a cold chalybeate spring, said to contain ·139 per mille bicarbonate and crenate of iron, small quantities of earthy salts, and traces of manganesium and arsenic.

The season is from June 1 to September 30.

Amongst French sulphide of sodium waters which have not yet been mentioned are the following:—Tramezaigues, Couret, Loudenvielle, Germs, and Beaucens, in the Department Hautes-Pyrénées; Mérens (near Ax-les-Thermes), Carcanières and the neighbouring Usson, in the Department Ariège; Escouloubre (near Carcanières) in the Department Aude; Saint-Thomas and Nossa-les-Bains in the Department Pyrénées Orientales; Berthement (31 miles from Nice) in the Department Alpes Maritimes; Saint-Mélany in the Department Ardèche.

The following may be added to the French waters containing sulphuretted hydrogen:—La Caille in Department Haute-Savoie; Castéra-Verduzan, and Barbotan (see also Chapter XII.), both of which have likewise chalybeate springs, in the Department Gers; Eugénie-les-Bains, Tercis and Préchacq,[1] in Department Landes; Cauvalat-le-Vigan in Department Gard. Euzet and Les Fumades in Department Gard have springs which are bituminous and sulphurous.

Pietrapola, in the island of Corsica, is picturesquely situated in a mountainous region, and possesses thermal sulphur springs (temperature 90° to 137° F.), containing about ·02 per mille sulphide of sodium.

Guagno or **Saint Antoine de Guagno** in the western

[1] Besides the cold sulphur spring there are at Préchacq thermal waters and mud baths, analogous to those of Dax.

part of Corsica, about 40 miles north of Ajaccio, possesses thermal sulphur springs and a military hospital. The 'Grande Source' has a temperature of 124° F., and contains ·02 per mille sulphide of sodium. The waters are employed for skin diseases, old gun-shot wounds, &c., as at Barèges.

Puzzichello, in the island of Corsica, at a low elevation, possesses cold sulphuretted hydrogen springs, which have a reputation in the treatment of cutaneous affections.

Acqui, in North Italy (Province of Alessandria).—Acqui (altitude 450 feet), in North Italy, 21 miles south-east of Alessandria, on the railway to Savona, possesses hot muriated sulphur springs, known already in Pliny's time as 'Aquæ Statiellæ.' The climate is moist and changeable, and hence patients should be provided with warm clothing. Of the eight springs the most important is La Bollente (1·5 per mille common salt), which emerges at 158° F., and in the different chambers has a temperature of 118° to 124° F. The temperature of the other springs is 102° to 142° F.

Acqui has a reputation for gouty and, especially, rheumatic joint complaints, and those resulting from injuries, also for neuroses and some skin affections. The local application of the hot 'fango,' a mud-like substance brought up from the bottom of the well, impregnated with organic matter and with the salts of the mineral waters, plays a chief part in the treatment, and may be compared to the similar treatment at Abano, Battaglia, and Valdieri, and to the mud baths of Dax, Saint-Amand, &c. The season is from May 15 to September 30.

Doctors : Schivardi, Alessandri, &c.

Vinadio, in North Italy (Piedmont), 22 miles from the railway station of Cuneo, possesses thermal muriated sulphur waters and natural vapour baths or 'stufe.' Applications of the hot mud ('fango') are employed as at Acqui, Battaglia, Valdieri, &c.

Valdieri, in North Italy (Piedmont), lies at an alti-

tude of 2,700 feet, in the valley of the Gesso. Its waters have been classed, like those of Battaglia, in the indifferent thermal group. (See Chapter VI.)

Abano (North Italy), one of the Euganean spas. The thermal waters have been described in the muriated group. (See Chapter VII.)

Battaglia, in Italy, has often been included amongst the thermal sulphur springs, but its waters contain no sulphur, and are best classed with the indifferent thermal group. (See Chapter VI.)

Tabiano (Italy, Province of Parma), four miles from the railway station of Borgo-San-Donnino, possesses cold sulphur waters. The position of its ancient mediæval castle on the crest of a hill is most picturesque, and there are various excursions to be made in the neighbourhood. The muriated waters of Salsomaggiore (*q.v.*) are three miles distant.

Porretta, in Italy (Province of Bologna), lies in the valley of the Reno, amongst the Apennines, at an altitude of 1,100 feet. It is a railway station on the line from Bologna to Pistoja, 37 miles distant from the former. The thermal waters (temperature 91° to 95° F.), known from ancient times, contain 8 per mille common salt (Sorgente Leone), traces of iodides, bromides, and arsenic, a little sulphuretted hydrogen gas, and some of the inflammable carburetted hydrogen or marsh gas. The action of the waters is laxative and diuretic; they are used in cases of hæmorrhoids, 'abdominal plethora,' &c., and in the form of baths for cutaneous affections and chronic rheumatism.

The marsh gas likewise exudes from fissures in the Sasso-Cardo Mountain above the town, and, according to Dr. Macpherson, can be collected in such considerable amounts that it has been at times utilised for lighting the town. The season is from June 30 to September 30.

The waters of **Viterbo** and **Acque-Albule** in the Province of Rome are thermal sulphurous. According

to Commaille and Lambert (1860) the latter water (75° F.) contains about 1·4 per mille bicarbonate of calcium, ·017 per mille sulphide of calcium, and 6·9 per mille volumes of sulphuretted hydrogen gas.

Civita Vecchia, the seaport of Rome, possesses thermal waters. The principal spring, Ficoncella, has a temperature of about 132° F., and is slightly sulphurous. There are likewise natural vapour baths.

Acireale, a flourishing town of Sicily, lies at an altitude of 560 feet, near the coast, on the south-eastern slope of Mount Etna. It is used as a winter climatic health resort, and possesses the 'Santa Venera' muriated sulphur wells (70° F.), which contain according to Silvestri (1872) 2·6 per mille common salt, ·01 per mille iodide of sodium, and, in 1,000 volumes, 10 volumes of sulphuretted hydrogen, 95 of carbonic acid, 21 of nitrogen, and 10 of carburetted hydrogen or marsh gas. The more elevated position of Acireale gives it some advantages over Catania, which lies nine miles to the south.

Sciacca, on the south-western coast of Sicily, 22 miles from the railway station of Castelvetrano, occupies the site of the ancient 'Thermæ Selinuntinæ.' It possesses thermal muriated sulphur waters (temperature 122°–125·6° F.) and compound chalybeate springs (82°–100° F.). Not far off are the natural vapour baths ('stufe') of San Calogero.

Panticosa (French Penticouse) in Spain (Huesca) is situated at an altitude of about 5,600 feet in the Pyrenees, near the French frontier, 12 hours' ride from Eaux Chaudes. The spa lies five miles from the village of Panticosa, and has almost the highest situation amongst European baths. St. Moritz, in Switzerland, is, however, higher.

The principal spring, chiefly used for drinking, is called 'del Hidalgo,' or the 'liver spring,' and this, as well as the 'Fuente de los Herpes' (*i.e.* 'eruption spring') and the 'Fuente de la Laguna,' may be classed amongst

the indifferent thermal waters (temperature 77° to 84·5° F.). The 'Fuente del Estómago,' or 'Stomach spring' (temperature 84·5°F.), is a sulphurous spring containing ·002 per mille sulphide of sodium and some sulphuretted hydrogen gas.

Climate must take a great share in the results obtained at this spa. The waters are especially employed in affections of the respiratory organs, in dyspeptic conditions, and in chronic skin eruptions. The season lasts from June 15 to September 15.

Trillo (Spain, Province of Guadalajara) lies on the Tagus, 50 miles from Madrid. It possesses thermal muriated chalybeate waters which smell of sulphuretted hydrogen, and have a temperature of 77° to 86° F. The water is used externally in rheumatism, skin eruptions, &c., and also internally in some cases.

Carratraca in Spain (Province of Malaga) is situated in a beautiful country, not far from Malaga, and possesses cold weakly mineralised sulphur waters (temperature about 63° F.), which have a reputation in Spain for skin affections and syphilis.

The thermal sulphur spas of Ledesma (Province of Salamanca) and of Montemayor (Province of Caceres) attract a great number of Spanish visitors; they both have beautiful situations at medium altitudes (above 2,000 feet). Other thermal sulphur waters in Spain are those of Cortegada, in the Province of Orense (this place possesses also sub-thermal chalybeate springs); Carballino, in the same province; Carballo, in the Province of Corunna; Ontaneda, in the Province of Santander; and Archena (temperature 131° F.) in the Province of Murcia. Santa Agueda, in the Province of Guipuzcoa, in the North of Spain, possesses cold earthy sulphuretted hydrogen waters, and a chalybeate spring.

Caldas-de-Rainha (Portugal, Province of Estremadura) possesses weak thermal muriated springs, containing sulphuretted hydrogen gas (temperature 96° F.). The water is used internally and externally in cases of

chronic rheumatism, &c. This spa is the most frequented one of Portugal, and is beautifully situated. There are two hospitals.

Other Portuguese thermal sulphur waters are those of Caldas-de-Vizella (said, according to Macpherson, to taste like Harrogate waters), and the very hot waters of San Pedro do Sul (about 152° F.).

Piatigorsk (Russia) lies at an altitude of 1,685 feet on the south-western slope of the Mashuka Hill, an outspur of the Caucasus Mountains, and possesses thermal muriated sulphur springs, having temperatures from 83·5° to 117° F. A kind of diluted mud bath is likewise made use of, the mud for which is obtained from Lake Tambukan, 7 miles distant. According to Dr. F. G. Clemow, Piatigorsk is a town of over 15,000 inhabitants, and the scenery in the neighbourhood is very beautiful. Though very cold in winter, the climate in summer during the season (May to September) is said to be pleasant. The Maria Theresa spring at the little German colony of Karras, about five miles from Piatigorsk, yields the 'bitter water of the Caucasus,' an aperient sulphated water, not unlike the well-known one of Hunyadi Janos.

Goriatchevodsk and **Bragoun** in the Caucasus (Russia) possess very hot sulphur waters, containing, it is said, traces of naphtha.

Kemmern (Russia) in Livonia has cold sulphur springs. Peat baths and sea baths are likewise made use of.

Bousk or **Busk** in the south of Russian Poland has sulphur waters and peat baths.

Thermopylae in Greece possesses very hot sulphur waters, up to about 150° F.

Sandefjord in Norway is a small town prettily situated on a little 'Fjord' on the North Sea, about four or five hours by railway from Christiania. It is the oldest mineral water station in Norway (the bath-house was built in 1837), and contains cold gaseous muriated

sulphur springs, used for drinking and bathing. There are also a chalybeate spring (containing, it is said, 1·29 per mille sulphate of iron and some alum) and a cold weak muriated spring with 4·4 per mille common salt.

Cold and hot sea-water baths are made use of, and a sulphurous slimy material found in the Fjord[1] is employed for rubbing the body, and in the form of hot applications for chronic articular rheumatism, &c. This practice was adopted from that existing at the marine spa of Strömstad in Sweden. Another curious practice is the application of living Jelly Fishes (*Medusa aurita*, *Cyanea capillata*) to produce a sort of counter-irritation of the skin in chronic rheumatic affections, neuralgias, &c. The season is from the beginning of June to September 1.

Laurvik (Norway), on the Laurvikfjord, near the mouth of the Laagen, five or six hours by railway from Christiania, possesses sulphurous and chalybeate springs, and a thermal establishment well known in Norway. A fine plantation of beeches is a feature of the spa. Besides the sulphur baths, sulphurous mud applications and Jelly Fishes are employed in the treatment of cases as at Sandefjord.

[1] See Ebbesen and Hörbye. 'The Sulphurous Bath at Sandefjord in Norway.' English translation. Christiania, 1862.

CHAPTER XV

EARTHY OR CALCAREOUS WATERS

These waters (see Chapter II.) differ much in the proportion of their constituents. Some of them, such as Bath and Loèche-les-Bains, have, for greater convenience, been classed under the simple thermal waters; others, such as Baden in Switzerland and Schinznach, under the sulphur waters. We have not thought it necessary to separate the alkaline earthy waters from the gypsum (sulphate of calcium) waters, but have included both in the present chapter.

Some alkaline earthy waters, owing to their alkalinity and astringent effect, act beneficially in digestive troubles, with tendency to attacks of diarrhœa and undue irritability of the mucous membrane.[1] Several spas of this class enjoy likewise a considerable reputation in chronic catarrhal conditions of the respiratory organs.

Whether in cases of osteomalacia, rickets, and tuberculosis, earthy waters have any special therapeutic value beyond that of aiding digestion, seems doubtful.

To their diuretic action (Chapter III.) waters, such as those of Contrexéville, probably owe part of their repute in cases of urinary gravel and chronic catarrhal conditions of the bladder and urinary passages. The chalk in the waters of Wildungen, &c., appears not in any way

[1] For the use of alkaline-earthy waters in various cases of dyspepsia, see the paper by Dr. M. Piatkowsky in the *Wiener klinische Wochenschrift*, 1898, No. 1, p. 10.

to increase the size of urinary concretions, unless in the case of phosphatic calculi they indirectly favour fresh deposits by increasing the alkalinity of the urine. Whether any of these waters have the power which has been claimed for them of inducing the breaking up and expulsion of urinary calculi appears doubtful; such calculi have been known occasionally to undergo spontaneous fracture and expulsion.

Dr. Karl Grube of Neuenahr has recently been directing attention to the possible use of calcium carbonate in diabetes mellitus (*Münchener Med. Woch.*, 1895, No. 22, and *Therapeutische Monatshefte*, May, 1896); if his observations be confirmed, one may perhaps hope that alkaline earthy waters will prove of some use in some cases of this affection, though he allows that the action cannot be a specific one, and specially mentions that in 'benign' diabetes, which includes the cases most suitable for spa-treatment, he found the calcium carbonate to have no effect at all.

In skin diseases, such as chronic eczema and psoriasis, the action of earthy waters [such as those of Loèche-les-Bains], when used in the form of prolonged thermal baths, by soaking and cleansing the skin, is doubtless more important than any special action exerted by the solid mineral constituents present in solution.

Amongst the spas of this group, Wildungen and Contrexéville will be described first, and the rest arranged in political geographical order.

Wildungen (Germany, Principality of Waldeck).—Wildungen is picturesquely situated in an open valley at an elevation of about 980 feet above the sea-level, and is fairly sheltered from cold winds. Bad-Wildungen proper is the western portion of the town, and consists nearly entirely of one long street, the 'Brunnen-Allée,' in the villas and hotels of which most of the patients lodge. The neighbouring woods afford delightful walks to those patients for whom open-air exercise is recommended.

At the western end of the Allée is the Georg-Victorquelle, medicinally made use of at least since the sixteenth century; here, during the season, the band plays in the morning, whilst the patients drink their water. The Helenenquelle is situated in the beautiful Helenenthal, about half an hour's walk in a south-westerly direction from Wildungen. The Königsquelle, near the railway station, is the private property of one of the Wildungen doctors. These three springs supply cold gaseous water, containing ·5 to 1·3 per mille of the bicarbonates of calcium and magnesium, and ·018 to ·036 of bicarbonate of iron. The Georg-Victorquelle is the least strongly mineralised (total mineralisation is only about 1·4 per mille), and but for its containing about ·029 per mille bicarbonate of iron, might be classed as a 'table-water.'

Of these three springs the Königsquelle contains the most iron (·036 of the bicarbonate), whilst the Helenenquelle contains ·84 per mille bicarbonate of sodium, and both of them contain a little over 1 per mille of each of the three salts—bicarbonate of calcium, bicarbonate of magnesium, and common salt.

Besides the above-mentioned three springs there is the (but little used) earthy chalybeate 'Thalquelle,' about two miles distant from the town, and near it is the 'Stahlquelle,' a strong fairly pure chalybeate spring (·07 per mille bicarbonate of iron), rich in carbonic acid gas. For the convenience of patients the waters of the Stahlquelle and the Helenenquelle, as well as milk and whey, are supplied at the Georg-Victorquelle.

The bath-house, which is also a dwelling-house ('Badelogirhaus') for patients who care to live there, is situated close to the Georg-Victorquelle, but is supplied by a separate spring. There is likewise a small bath-house at the other end of the town, attached to the Königsquelle.

The patients who resort to Wildungen nearly all suffer from affections of the urinary system, or at least

have symptoms resembling those due to one of these affections. There are patients with vesical calculus, chronic cystitis, pyelitis, enlarged prostate and its results, gonorrhœa, and urethral stricture. Some suffer from uric acid gravel, and some have slight albuminuria, with or without organic change in the kidneys.

The diet in the hotels is regulated to suit the class of cases chiefly met with at Wildungen; beer, mustard, highly-seasoned and rich dishes are hardly to be seen on the tables; patients are especially recommended to observe great moderation in alcoholic drinks and sweet dishes. It must not, however, be supposed that Wildungen is resorted to merely by patients, for its agreeable situation attracts ordinary visitors and tourists, and will probably cause it to become still more esteemed as a summer resort than it is at present.

The waters are taken in the morning before breakfast, often again at noon, before the midday meal, and sometimes once more in the afternoon. The water, in the case of many patients, is best warmed before drinking, though most of the carbonic acid gas must thereby escape. For this purpose troughs of hot water, as at many other spas, are supplied, and the glasses containing the mineral water are placed in them for a minute or two; the mineral water may likewise be warmed by the addition of a little hot water or hot milk. Sometimes the mineral water cannot be borne on an empty stomach, and in such cases the patient may drink a cup of tea or coffee first, or may mix milk or whey with the mineral water.

The baths are prescribed for only a small proportion of patients; for example, such as suffer from the uric acid diathesis, kidney troubles, or to strengthen the action of the vesical musculature in atonic conditions. The water of the baths is usually warmed to 77°—99° F., and their stimulating action (sea salt or alkali is sometimes added) is increased by the bubbles of carbonic acid gas which move along the skin of the

bather. The baths are usually taken in the forenoon, an hour or thereabouts before the midday meal. They are not prescribed when there is any tendency to hæmorrhage.

It is, however, the operative skill of the resident medical men that has given Wildungen the reputation that it possesses as 'a surgical spa' in diseases of the urinary organs, a reputation which Marc considers originally in great part due to Stöcker. Vesical calculi are got rid of by lithotrity, strictures of the urethra are dilated or cut, and other surgical methods of treatment are employed. It is not, of course, maintained that mere drinking of the waters can cause solution of vesical calculi, or relaxation of a urethral stricture, though it may render the condition for operative interference more favourable.

The greater part of the patients are men, but women come for gravel and for various urinary troubles; sometimes also, it is said, for an irritable condition of the bladder, not due to cystitis, but secondary to other pelvic troubles.

The Helenenquelle, owing to its alkalinity, is preferred to the Georg-Victorquelle in cases of much irritability of the bladder with highly acid urine; and owing to its being more easily borne by the stomach, it is preferred in most cases at the commencement of the course, especially if there be any tendency to constipation. On the other hand, the Georg-Victorquelle is more suitable when there is much vesical catarrh, with alkalinity of the urine, or when there is phosphaturia without mucus or muco-pus. When the patient is anæmic the Stahlquelle often forms a useful adjunct to the cure.

When, in addition to the urinary trouble, there is a tendency to bronchitis, or digestive disturbances, these associated conditions are likely to be remedied by the alkaline waters of the Helenenquelle, the wholesome diet provided, and the pure refreshing forest air.

Owing, however, to the special reputation of Wildungen, it is less known as a health resort for such disorders, when not associated with urinary troubles, than some other places with waters belonging to the same class.

The principal season lasts from May 10 to September 25, but patients can be received in Wildungen at all other times of the year.

Access: In about 22 hours by Cologne and the branch line from Wabern. It is reached in two hours from Cassel.

Accommodation: Good.

Doctors: Marc, Reinhold, Rörig, Schmitz, Severin, Winkhaus.

Contrexéville (France, Department of Vosges).—The village (altitude 1,150 feet) is a station on the railway, 13 hours by train from Paris. There are several springs of cold earthy water, the most famous of which, the 'Source Pavillon,' was first analysed and made known by Bagard in 1760, and contains, according to Debray (1864), 1·5 per mille sulphate of calcium, ·4 per mille bicarbonate of calcium and minute quantities of iron, arsenic, and fluoride of calcium. The Contrexéville waters are employed for drinking in rather large amounts, producing diuresis, and having a slightly laxative effect. Baths and douches are sometimes employed as adjuvants to the internal use of the waters.

The reputation of the spa is very great for affections of the urinary organs, which are 'washed out' by the treatment; for uric acid gravel, and oxaluria, and for chronic cystitis. There are stories of vesical calculi undergoing spontaneous fracture in the bladder, and being passed in the urine, whilst the patients are under treatment, but this does occasionally, though rarely, occur elsewhere, without drinking medicinal waters. Contrexéville is of use for some gouty conditions in weak subjects, for gouty glycosuria, and according to French authorities for various hepatic complaints.

Its occasional use in children with nocturnal

enuresis has been maintained by Dr. Debout d'Estrées, and is confirmed by Sir F. R. Cruise of Dublin, who knows of a number of obstinate cases cured by the dietetic use of the ' Source Pavillon.' Besides removing any specially irritating quality of the urine, which may act as an exciting cause of the nocturnal incontinence, it is suggested that the mineral water may exercise a local tonic action in such cases.

The water is generally taken in the morning only, and not, as sometimes at the neighbouring spa of Vittel, in the afternoon likewise. The doctors at Contrexéville find that if the water is taken with meals, or in the afternoon as well as in the morning, it is apt to act on the bowels during the night time.

Ordinarily the course lasts about 21 days. The patient begins with two or three half glasses, and the quantity is gradually increased till in usual cases six or even more glasses, each holding about a third of a litre, are taken in the morning, with about half an hour's interval after each glass. The patient has to rise very early when he drinks much, for he ought to finish drinking at least an hour before breakfast, a meal generally taken at ten o'clock. Dinner time is about 6 P.M. The English, instead of the big meal at ten, often take only a small breakfast, have luncheon later on (about one o'clock), and dine at the usual French time.

The situation of the spa in a shallow valley (of the Vair) on a broad elevated plateau makes the climate fairly bracing, and visitors should be furnished with warm clothes. There is nothing peculiar about the amusements at Contrexéville. Music is provided before breakfast and in the afternoon, and the mode of passing the time is the same as at other spas. Most people find the life pleasant. The season lasts from the end of May to the middle of October.

Access: About 18 to 20 hours from London, *viâ* either Calais or Boulogne, and Laon.

Accommodation: Good. Large hotels adjoin the establishment.

Doctors: Debout d'Estrées, Boichox, Mabboux, Aymé, Graux, Thiéry, &c.

Bath in England. This spa has been placed in the simple thermal group (see Chapter VI.).

Lippspringe (Prussia, Province of Westphalia), 5½ miles from the railway station of Paderborn, lies at an altitude of 450 feet, in a plain, to some extent protected by the Teutoburg Forest on the north. The weak earthy waters of the Arminiusquelle (temperature 70° F.), having a total of mineralisation of 2·4 per mille, contain about ·7 per mille each of sulphate of calcium and sulphate of sodium, with smaller quantities of earthy carbonates, and ·015 bicarbonate of iron. About 83 per cent. of the gas given off from the water consists of nitrogen. The rest is carbonic acid gas with minute quantities of oxygen and carburetted hydrogen.

These waters are used for drinking, bathing, and for inhalation of nitrogen gas, but in recent years less for inhalation than formerly. The climate is rather humid and equable. Lippspringe is resorted to for chronic bronchitis, remains of pleuritic effusion, and chronic pulmonary tuberculosis; in the treatment of the latter affection its reputation is partly due to the writings of the late Dr. Rohden. Season: May 15 to September 15.

Doctors: Dammann, Everken, Frey, Hinsch, Koeniger.

Inselbad, ¼ hour's distance from Paderborn, is an establishment for the treatment of asthma and chronic affections of the respiratory organs. The 'Ottilienquelle' (temperature 58° F.) is a weakly mineralised earthy spring, containing 40 per mille volumes of nitrogen, and some carbonic acid gas. There are likewise a chalybeate spring, used for drinking, and a sulphur spring.

Auerbach (altitude about 320 feet), a pleasant village in the Grand Duchy of Hesse, half an hour from Darmstadt, with beautiful beech woods in the neighbourhood, is a summer resort, and possesses weak earthy mineral waters, used for bathing.

Gran (Hungary) has thermal earthy waters (temperature 83·6° F.), and bathing arrangements. It possesses likewise a strong 'bitter water,' containing 45 per mille sulphate of magnesium.

Szkleno (Hungary) is picturesquely situated in a deep, well-wooded valley, at an elevation of 1,130 feet above sea-level, 2½ hours' drive from the railway station of Garam-Berzencze. Its thermal waters (99·5° to 128° F.) resemble those of Loèche-les-Bains, and contain 2 per mille sulphate of calcium.

Krynica in Galicia. Its alkaline-earthy chalybeate waters have already been alluded to in the chalybeate group (see Chapter XII.).

Weissenburg (Switzerland, Canton of Bern).—The principal ('new') establishment is situated at an altitude of 2,820 feet, 1¼ mile from the village of Weissenburg, in a thickly wooded, sheltered valley leading north-west out of the Simmenthal. The smaller ('old') establishment lies about ½ mile higher up the valley in a romantic gorge. The medical use of the spring dates at least from the early part of the seventeenth century. The dense vegetation (chiefly pine and beech trees), the freedom from dust, the absence of winds except the ordinary refreshing valley currents, and the numerous shady walks on both sides of the ravine above the torrent must be especially mentioned. According to H. Schnyder the mean relative humidity during summer is high, doubtless owing to the forest, and spray from the torrent and waterfalls.

The mineral water (temperature 79° F.), which tastes like ordinary drinking water with the chill taken off, is practically only used internally; it contains, according to Stierlin's analysis (1875), 0·95 per mille sulphate of calcium[1] and a smaller amount of sulphate of magnesium; owing to the slight total mineralisation (1·39 per mille)

[1] Phosphate of calcium has been noted in the Weissenburg water, but, according to Stierlin's analysis, the total amount present is only ·0004 per mille.

it may be classed either in the earthy or in the indifferent group. It exerts a diuretic action, and is said to cause constipation at first, but later on relaxation of the bowels. The dose commenced with is small, sometimes only about an ounce, but the quantity may be increased gradually until about a pint or more is taken in the day. If much constipation is caused a little sulphate of magnesium can be added to the minute amount which the spring water naturally contains. In affections of the respiratory organs the water is held to make expectoration easier. In the case of all weak patients Huguenin advises that the early doses of the water be taken in bed, in order to avoid any over-fatigue.

Affections of the respiratory organs, including notably the early stages of pulmonary tuberculosis, form the chief class of cases treated at Weissenburg; the climate, general hygienic conditions, and calming influences of the site, play doubtless a large part in the results obtained. The season lasts from May 15 to September 30.

Access: The principal establishment may be reached by carriage in about 3½ hours from the railway station of Thun.

Accommodation: Good.

Doctors: Huguenin (from Zurich), Enderlin.

Faulensee-Bad (Canton Bern) has an altitude of about 2,600 feet, and lies about twenty minutes distant above the village of Faulensee, a landing station on the southern side of the Lake of Thun. The view across the Lake is magnificent. The cold mineral water, according to Müller and Simmler, contains about 1·5 per mille sulphate of calcium, a minute amount of bicarbonate of iron, and a trace of sulphuretted hydrogen.

Loèche-les-Bains, in Canton Valais, Switzerland. This spa has been described in the simple thermal group (see Chapter VI.).

Saxon (Switzerland, Canton of Valais), a station on the railway from Lausanne to Brigue, lies in the valley

of the Rhone at an elevation of 1,560 feet. Its weakly mineralised earthy waters have a total mineralisation of about one per mille, and contain minute quantities of the bromides and iodides of calcium and magnesium, but the iodides are said by Dénériaz to be occasionally for short periods altogether absent. The place is at present hardly, if at all, visited for its waters.

The climate is not bracing; the heat is often excessive; and the place is during some of the summer months infested by mosquitoes.

Bergün, a village in the Grisons, Switzerland, is a summer resort, situated on the western slope of the Albula pass at an altitude of about 4,550 feet. It possesses a gypsum spring (total solids, 1·4 per mille), containing a little bicarbonate of iron.

Vals in Canton Grisons possesses sulphate of calcium waters, having a temperature of 77° to 79° F., and a total mineralisation of about 2 per mille. The establishment lies at an elevation of 4,100 feet, in the Valserthal, five minutes from Vals-Platz and 14 miles from Ilanz. The baths are little used.

Peiden (Switzerland, Grisons) is beautifully situated in the Lugnetz Valley, at an altitude of 2,700 feet, about 3½ miles to the south of Ilanz. It possesses cold alkaline earthy waters containing a moderate amount of bicarbonate of iron and free carbonic acid gas.

Bagnères-de-Bigorre (France, Hautes-Pyrénées) is beautifully situated at an altitude of 1,890 feet, in the valley of the Adour, and possesses three groups of waters: (1) earthy and indifferent thermal; (2) chalybeate; and (3) sulphurous. The springs, therefore, vary much in their medical properties.

The *first group* is the most important, and some at least of its members may, like the waters of Loèche-les-Bains (Chapter VI.), be equally well classed as simple thermal waters. At the head of the first group must be placed the abundant 'Source Salies,' the hottest spring of Bagnères. Its temperature is 123° F., and according

to the analysis by Willm, it contains 1·8 per mille sulphate of calcium, ·38 sulphate of magnesium, ·12 bicarbonate of calcium, ·0016 bicarbonate of iron, and ·0003 arseniate of sodium. Of very similar mineralisation are the springs, La Rampe (temperature 95° F.), Platane (temperature 91·5° F.), Dauphin (temperature 120° F.), St. Roch (temperature 105·8° F.), Des Yeux (temperature 91·5° F.), Foulon (temperature 95° F.), La Peyrie (temperature 77° F.), and the springs of Salut [1] (temperature 89·6° to 91·4° F.). The waters of the first group can be employed internally and externally, according to special indications, in gastralgia and irritable functional nervous disorders, in some chronic urinary and uterine affections, and in some chronic rheumatic conditions. The Source Salies, as excavations have shown, was certainly employed by the Romans.

The *second group* includes various chalybeate springs, some of which contain also a little arsenic. They are however not gaseous like the well-known chalybeate springs of Spa and Schwalbach.

The *third group* consists of the cold sulphur water of Labassère (7½ miles from Bagnères), which is conveyed to the spa in closed receptacles. According to the analysis of Willm it contains ·046 per mille sulphide of sodium; it is used, like the waters of Eaux Bonnes and Cauterets, in chronic catarrhal conditions of the pharynx, larynx and bronchi.

The main bath establishment of Bagnères is supplied by the Source Salies and several of the other springs. It is here also that the water of Labassère may be obtained.

In the 'Néothermes,' in the same building with the Casino, are piscines for the use of several persons together; they are supplied by the Source Salies, and used for prolonged baths after the fashion of Loèche-les-Bains (see Chapter VI.). There is likewise a larger swimming bath.

[1] Argon is said to have been found in the Salut waters, as in those of Bath, Buxton, &c.

The establishment of Salut is about a mile distant from the town, but patients can be conveyed there in vehicles provided for this purpose.

The season is from the middle of June to the middle of October, but the baths are open all the year round. Bagnères-de-Bigorre is also a favourite climatic station.

Access: By railway *viâ* Bordeaux and Tarbes.

Accommodation: Fair. A large number of the visitors take furnished apartments.

Doctors: Dejeanne, Bagnell, Middleton, Gandy, De la Garde, Lafforgue, &c.

Capvern (France, Hautes-Pyrénées), a station on the railway from Toulouse to Bayonne, has thermal establishments pleasantly situated, in the neighbourhood, at an altitude of about 1,550 feet. It possesses weakly mineralised earthy waters, containing about 1 per mille sulphate of calcium (temperature 70° to 76° F.). Accommodation is satisfactory.

Siradan (France, Hautes-Pyrénées) has an altitude of 1,470 feet, and is beautifully situated at the entrance of a valley, about 12 miles from Bagnères-de-Luchon. It possesses cold earthy springs (1·3 per mille sulphate of calcium), and cold, weak, chalybeate waters.

Audinac (France, Department of Ariège) lies at an altitude of about 1,470 feet, in a pleasant valley at the foot of the Pyrenees, and is about 3 miles by road from the railway station of Saint-Girons. The waters have a temperature of about 70° F., contain about 1·2 per mille sulphate of calcium, and are slightly ferruginous.

Aulus (France, Department of Ariège) is situated at an altitude of 2,550 feet, in a picturesque valley of the Pyrenees, 20 miles south of Saint-Girons, the nearest railway station. It possesses tepid springs containing about 1·6 per mille sulphate of calcium. These waters exercise a laxative and diuretic action, and are said to aid in the treatment of troublesome cases of tertiary syphilis. There are satisfactory bath arrangements.

Cransac (France, Department of Aveyron) is a village with a station on the railway between Rodez and Capdenac; it lies (altitude 980 feet) at the foot of the still active volcano of Le Montet. Cransac possesses cold earthy waters which contain, in addition to sulphate of calcium and sulphate of magnesium, a certain amount of the sulphates of potassium, aluminium, iron, and manganesium. The 'Source Basse Richard' (about 2 per mille each of the sulphates of magnesium and calcium) has a laxative action, and is used in cases of dyspepsia with chronic constipation, jaundice, &c. It has likewise a reputation in chronic malaria with enlargement of the spleen.

In the mountain sides are crevices, which are used as natural vapour baths (temperature 90° to 118° F.) for chronic rheumatic cases; the air in them contains sulphurous vapours as in the 'Stufe di San Germano,' the 'Solfatara' near Pozzuoli, and some other natural vapour baths in Italy.

Pougues-les-Eaux (France, Department of Nièvre) lies at an altitude of 650 feet, on the right bank of the Loire, about 8 miles from Nevers. It possesses cold alkaline earthy waters (1·7 per mille of bicarbonate of calcium and ·7 per mille bicarbonate of sodium in the Saint-Léger spring), which are used for dyspeptic troubles, chronic diarrhœa, and urinary affections. There is good accommodation, and a small thermal establishment is situated with the Casino in a pleasant park. Pougues has a railway station on the line from Paris to Nevers.

Vittel (altitude 1,100 feet) and **Martigny-les-Bains** (altitude 1,200 feet), in Department Vosges, are stations on the railway, 4 and 6 miles respectively to the north-east and south-west of Contrexéville. They possess cold earthy springs, resembling those of the latter spa, and used for similar classes of affections. Their position and climate likewise resemble those of Contrexéville. The seasons are from about the end of May to about the third week in September.

Doctors: Patézon, Bouloumié, &c. (at Vittel); Dedet (at Martigny).

Other French waters somewhat analogous to the waters of Contrexéville are those of Saint-Vallier, Heucheloup, Norroy-sur-Vair, and Remoncourt, all in the Department of Vosges, and the waters of the Source Maynard and Larivière-sous-Aigremont in Department Haute-Marne, near Bourbonne-les-Bains (*q.v.*).

The following French cold or tepid sulphate of calcium waters have not yet been mentioned: Encausse (1·7 per mille), and Barbazan (1·5 per mille) in Department Haute-Garonne. Le Monestier-de-Briançon (Department Hautes-Alpes) has waters with a temperature of 71°–113° F., containing ·5 to 1·5 per mille sulphate of calcium.

Bagni di Lucca (Italy, in the Province of Lucca). The spa (altitude 400–1,000 feet) is situated at the foot of the Apennines, in the beautiful valley of the Lima, 15 miles north of the town of Lucca. Three villages help to make up the spa, namely Ponte Seraglio, Bagni Caldi (1,000 feet above sea-level), and Villa; of which the two latter are most frequented by English visitors.

The baths of Lucca have been known from an early period. The Emperor Frederick II. paid them a visit in 1245. Fallopius and the physician Biancello spoke in praise of them, and in 1581 Montaigne sought aid there. In more modern times they have been visited by Byron, Shelley and Heine.

The springs vary in temperature from 98° to 129° F., and their thermal sulphate of calcium waters contain about 2 to 3 per mille solids. The hottest and most famous is that of Bagni Caldi, with 1·75 per mille calcium sulphate and ·75 per mille sodium sulphate. Here is likewise the chief bath establishment with a grotto used as a natural vapour bath. The Aix douche-massage and other douches, and massage, and mud baths can likewise be had at Bagni Caldi.

The thermal baths of Lucca are used in gouty and

rheumatic affections, rheumatoid arthritis, and other cases amenable to simple thermal and thermal earthy baths. The bath establishments are open from May 1 to September 15, but the chief season is during June and September, when the place is much resorted to by the inhabitants of Florence. Many of the visitors come merely for amusement and change of air. The spa might, as Dr. Danvers suggests, sometimes serve as a transitional station for patients from the Riviera in spring, or from Karlsbad and other active mineral water stations in autumn.

Accommodation: Satisfactory.

Access: The branch line from Viarregio runs to Ponte-a-Moriano, whence the baths of Lucca are reached in 1½ hour by diligence. It is hoped that the railway will soon be completed to the spa itself.

Doctors: H. Danvers, Gueirolo, Bastiani.

Chianciano (Central Italy, not far from Montepulciano) lies in the valley of Chiana, at an altitude of about 1,800 feet. It is reached from the railway station of Asciano by half an hour's drive, and possesses thermal earthy waters (temperature 100° F.), chiefly used for bathing. The total mineralisation is between 3 and 4 per mille (chiefly sulphate and carbonate of calcium). There are likewise gaseous chalybeate springs.

Besides the foregoing there are several other Italian earthy mineral springs, now comparatively little known, but some of them celebrated in ancient times.

Urberoaga de Alzola (Spain, Province of Guipuzcoa, a few hours' drive from San Sebastian) is picturesquely situated in a gorge with beautiful environs. It possesses weak alkaline earthy waters (temperature about 87° F.), and has been very misleadingly called the 'Spanish Vichy' (see under 'Vidago'). It has a reputation in affections of the bladder and urinary organs. The waters are used both internally and externally.

CHAPTER XVI

TABLE WATERS, AND VERY WEAKLY MINERALISED COLD WATERS

'TABLE waters' are feebly mineralised waters, usually containing a large quantity of free carbonic acid gas, and may therefore likewise be termed 'simple gaseous' or 'simple acidulated waters' (in German, 'Einfache Säuerlinge'), or, when none of the gas has been artificially added,[1] they may be called 'natural simple aërated waters.' If the gas has been artificially added, it usually escapes more speedily on opening a bottle.

These waters may be of some use in medicine. They mostly contain minute quantities of bicarbonate of sodium, or of bicarbonate of calcium, or of both bicarbonates, and these may, in association with the carbonic acid gas, exercise a favourable effect in dyspeptic conditions. The carbonic acid gas in table waters stimulates the nerves and musculature of the stomach; in moderate quantities it aids digestion, promotes peristalsis, and relieves dyspeptic feelings; it probably also exerts some diuretic influence and tends to increase the flow of bile.

Such waters, however, are more frequently used for ordinary drinking at meals, or for refreshing draughts between meal-times, than for strictly medical purposes. Needless to say, iron salts in any considerable quantity and much bicarbonate of sodium mix badly with wines. The amount of solids contained in table waters should

[1] The French Government does not ordinarily permit the addition of CO_2 to mineral waters. It may be noted, however, that the addition of CO_2 to mineral waters, if naturally poor in gas, may undoubtedly help to preserve them.

not be sufficient to give them any strong taste; and the carbonic acid gas present (sometimes additional CO_2 is added before bottling) should be sufficient to prevent the precipitation of the mineral constituents and enable the water to 'keep well.' Much, however, of the temporary popular preference of particular 'table waters' over others depends on mere fashion and advertisement.

One of the great advantages which these waters have over many of the ordinary manufactured aërated waters is that the perfect purity of the water may be almost certainly relied on[1]—an inestimable advantage when there is reason to suspect that the ordinary drinking water of a town may be contaminated. The constant use[2] of large quantities of highly gaseous table waters, whether natural or artificial, is, however, a habit not to be recommended.

Most of these waters are well known by advertisements, and as most of them have comparatively little to do with ordinary spa treatment, it will be sufficient here to enumerate them. They can be roughly divided into three classes, according as their mineral constituents show them to be weakly mineralised members of (1) the simple alkaline group of mineral waters, (2) the muriated alkaline group, or (3) the earthy group. The third class includes the alkaline earthy table waters, and those which,

[1] The same can, however, be said for those artificial table waters in the manufacture of which distilled water only is used, or water which has been filtered through properly kept Pasteur-Chamberland, Berkefeld, or other reliable filters.

[2] The use of aërated waters in some persons tends to keep up laxity of the motions. In cases of 'morning diarrhœa,' according to Dr. Lauder Brunton ('On Some Forms of Diarrhœa, especially Morning Diarrhœa,' *Quarterly Medical Journal*, January, 1894), any aërated water either with or without alcohol, taken during the evening, has an especial tendency to keep up this troublesome complaint.

Some patients when taking a course of laxative waters must apparently abstain from taking aërated table waters during the course, on account of the motions becoming too fluid or frequent when both waters are being taken. Gaseous waters have also been held responsible for symptoms due to disturbances in the cerebral circulation.

though they contain bicarbonate of sodium, contain as much or more bicarbonate of calcium (*i.e.* belonging to the French group, Eaux bicarbonatées mixtes).

In the first group may be placed : Apollinaris near Neuenahr, the Johannis spring at Zollhaus, Gerolstein, Birresborn, Toennistein, all in Rhenish Prussia ; Oberlahnstein, near Ems ; Teinach (the Hirschquelle), in Würtemberg ; Sultzmatt (French, Soultzmatt), in Alsace ; Giesshuebl and Krondorf, near Karlsbad, in Bohemia ; Preblau (Chapter VIII.) ; Adonis water, in Belgium. In France we have : Teissières-les-Boulières (Department Cantal), Bussang (containing appreciable amounts of iron, manganesium and arsenic, see Chapter XIII.), Couzan or Sail-sous-Couzan, and the most weakly mineralised of the Vals springs (such as the Pauline, Délicieuse No. 1, Saint Jean and Impératrice, see Chapter VIII.) Of these waters, Birresborn contains as much as 2·8 per mille bicarbonate of sodium, and is therefore rather strongly alkaline for an ordinary 'table water.' Bilin (3·3 per mille) and Fachingen (3·5 per mille) contain too much bicarbonate of sodium to be classed as ' table waters.'

In the second group may be placed Roisdorf, Niedermendig (Reginaris spring), and Rhens in Rhenish Prussia ; Rosbach, near Homburg, the Kronthalbrunnen, and the Wilhelmsquelle at Kronthal, the Taunusquelle near Frankfurt, Geilnau and Selters [1] (Niederselters, natural Seltzer water), all in the Prussian Province of Hesse-Nassau ; Schwalheim near Nauheim (*q.v.*) ; the Eyach-Sprudel in Würtemberg, near Stuttgart ; and the Acqua Acetosa, near Rome.

The third group includes the following : Bellthal, in Rhenish Prussia ; the Selzerbrunnen in Hesse-Darmstadt ; the spring of Goeppingen, in Würtemberg, mentioned by Paracelsus ; Roemerquelle in Carinthia ; and the following French waters :—Condillac, Bondonneau, Oriol, Châteldon, Saint-Galmier (which may

[1] Selters water contains as much as 2 per mille common salt.

be obtained charged with additional CO_2), Renaison, Fourchambault and Saint-Alban.

The water of Evian unlike most table waters is very poor in gas, and may be considered a very pure ordinary water, like the similar waters of Romanel (near Lausanne), Aigle-les-Bains, and Henniez-les-Bains, in Switzerland, and also like Alet (Chapter VI.) and the Source Cristal-Château, both obtainable as table waters in Paris. In England the natural Malvern water (still or aërated) on account of its known purity and freedom from excess of calcium carbonate is useful for certain cases in the same way as distilled water is.

Many spas, described in other chapters, besides their better known, more active mineral springs, possess also weakly mineralised gaseous waters, which are or could be employed as simple table waters. Amongst these are the Ludwigsbrunnen, at Nauheim; the Dorotheenquelle, at Karlsbad, in Bohemia; the Lindenquelle, at Schwalbach; the Christiansbrunnen at Liebwerda; the Sinnbergerquelle at Bruckenau; La Vernière spring near Lamalou (*q.v.*); the Saint-Pardoux spring near Bourbon-L'Archambault (*q.v.*), &c.

Many waters used as table waters contain small amounts of iron, sometimes more than is advisable for ordinary table use: thus Saint-Alban (Puits César) and Châteldon (Puits Rond) have over ·02 per mille of the bicarbonate of iron, and Oriol (near Grenoble), according to O. Henry, has ·04 per mille. Some table waters are sufficiently mineralised to be mentioned separately in other groups; thus, Birresborn, Toennistein and Preblau are mentioned likewise amongst the simple alkaline waters. In some cases arrangements for the accommodation of visitors, with bath establishments, &c., exist at very weakly mineralised springs, as at Evian, Giesshuebl, &c., and these we must therefore mention separately as spas.

Giesshuebl-Puchstein (Bohemia) is pleasantly situated in the valley of the Eger, on both banks of the

stream, about six miles distant from Karlsbad. There is a bath establishment, but its mineral water is chiefly exported for use as a gaseous table water.

Schmecks or **Tatra-Füred** (Hungary, Zips) consists of three neighbouring localities in the Carpathian Alps, on the southern declivity of the Tatra: Alt-Schmecks (altitude 3,320 feet), Neu-Schmecks (3,300 feet), and Unter-Schmecks (3,080 feet). They possess gaseous springs used for table waters and effervescent baths; also arrangements for ferruginous moor baths and hydrotherapeutic treatment. At Neu-Schmecks there is a sanatorium for phthisical patients, open throughout the year. The nearest railway station is Poprad-Felka, 1½ hour distant.

Roemerquelle in Carinthia has a well-wooded situation at the foot of the Ursulaberg, 1,670 feet above sea-level. It can be reached by an hour's drive from the railway station of Prevali.

Fuscherbad or **St. Wolfgang's Bad** (Austria, Styria) lies at an altitude of about 4,040 feet in a sheltered side valley of the beautiful Fuscherthal. The springs, known from the 15th century, appear to be ordinary good water. Fusch is a suitable mountain climatic station in many cases, and is not rarely visited by patients after a course of thermal baths at Gastein. The nearest railway station is Bruck, about two hours distant.

Evian-les-Bains (France, Savoy) is situated on the Lake of Geneva, opposite Lausanne, at an altitude of 1,240 feet. The cold alkaline waters are so feebly mineralised that they may almost be regarded as pure waters. According to the analysis made by E. Willm in 1894, the Source Cachat, which may be taken as the type of the Evian springs, has a total solids of 0·3 per mille, chiefly calcium carbonate (0·19 per mille). Like simple water, the waters of the Evian springs exert a diuretic action; and they have a reputation for affections of the urinary organs and the uric acid diathesis, for gastralgia in gouty subjects, nervous dyspepsia, &c. They are used

chiefly for drinking, but also for bathing, and there are likewise arrangements for hydrotherapeutic treatment, the Aix douche-massage and Swedish gymnastics. The season is from June to the commencement of October. In the case of anæmic and cachectic patients the neighbouring weak chalybeate water of Amphion-les-Bains may be used. Amphion is about one mile to the west of Evian, and possesses also waters analogous to those of Evian.

Doctors: Bordet, Million, &c.

Thonon (France, Haute-Savoie) has cold weakly mineralised waters, similar to those of Evian-les-Bains. The town lies on the southern shore of the Lake of Geneva, six miles to the west of Evian, but on a cliff about 130 feet above the lake.

With the springs of Fusch, Evian, Thonon, Aigle, &c. may be classed the cold weakly mineralised springs of Malvern and Ilkley, in England, and other nearly pure water springs much used in former times for their supposed special therapeutic effects, but in modern times, if used medicinally at all, used on ordinary hydrotherapeutic principles, sometimes in connection with special establishments. A great number of cold weakly mineralised springs, having a therapeutic reputation, exist in different parts of Europe. Some of them are classed as weakly mineralised earthy waters; others contain so much free carbonic acid gas that they belong to the simple gaseous group; others again, though they contain only minute quantities of the bicarbonate of iron, sometimes considerably below ·01 per mille, are yet classed as chalybeate waters.

One finds the cold waters of Empfing (or Wildbad Empfing) and of Adelholzen (or Wildbad Adelholzen) in Upper Bavaria, with a total mineralisation of under one-half per mille, still classed in the alkaline earthy group, and so also the cold waters of Reheburg in Hanover, with a total mineralisation of about 1 per mille.

There are also cold weakly mineralised springs with or without much free carbonic acid gas, containing a minute quantity of some special constitutent, for which a particular therapeutic effect has been claimed, and these springs we shall group together here for convenience. Such are the springs of Saint-Christau, containing a minute quantity of sulphate of copper, the 'phosphatic waters' of Aiguemont, and the 'iodine-springs' of Krankenheil. The weakly mineralised springs of Fideris in Switzerland, Fuered in Hungary, &c. may likewise be mentioned in the present chapter.

Krankenheil-Tölz (Upper Bavaria).—Krankenheil is beautifully situated on the northern slope of the Blomberg, at an elevation of 1,130 feet above the sea. It is separated from Tölz by the Isar. Its cold weakly mineralised waters are most conveniently classed in this group, though they are usually mentioned with the muriated springs. They contain ·19 to ·33 per mille bicarbonate of sodium, ·03 to ·29 per mille chloride of sodium, about ·001 per mille iodide of sodium, and a little sulphuretted hydrogen gas.

With such a weak mineralisation it is difficult to see what special therapeutic effect the water can have, but it may be noted that salts derived from the Krankenheil waters, soaps made with the salts, and the concentrated mineral water, are all made use of in the treatment of patients. Krankenheil has a certain reputation in scrofulous affections, chronic endometritis, skin eruptions, &c. The season lasts from May 15 to October 1.

Zaizon (Transylvania, altitude 2,590 feet), a spa visited chiefly by women and children, contains the weak gaseous muriated-alkaline 'Ferdinand's spring' (1·3 bicarbonate of sodium, ·6 common salt) which attracted some attention on account of its being said (probably by error) to contain ·25 per mille iodide of sodium. There are also weak chalybeate waters.

Coise (France, Savoie), two miles from the railway station of Cruet, has the 'Fontaine de la Saulce,' whose

alkaline waters, with a total mineralisation of ·9 per mille, contain ·007 per mille iodide of magnesium and ·001 per mille bromide of magnesium. The water has an old local reputation against goitre.

Saint-Christau (France, Department of Basses-Pyrénées), a small spa situated at an altitude of 985 feet, in the narrow Pyrenean Valley of Aspe, possesses feebly mineralised cold earthy waters (total solids ·2–·5 per mille). According to Willm (1882) the 'Source Arceaux' contains ·001 per mille of carbonate of iron and manganesium and ·0003 per mille of sulphate of copper. The waters, besides being used for drinking and bathing, have been employed in a finely pulverised form for chronic laryngitis and pharyngitis, and for the eye in chronic blepharitis and conjunctivitis.

Aiguemont (France, Seine-et-Oise) has a cold weakly mineralised water, which, according to the 1887 analysis, contains 0·179 per mille calcium phosphate, 0·2 calcium bicarbonate, 0·04 calcium nitrate; it has a total mineralisation of only 0·7 per mille, and a moderate amount (86 volumes per mille) of carbonic acid gas. Some importance has been claimed for this water, on account of its phosphatic contents, in scrofulous and rachitic conditions of children. It has likewise been recommended for use as a table water at meals.

Fuered (Balaton-Füred), a popular spa in Hungary, at an altitude of 480 feet, is beautifully situated on the Plattensee, one hour by steamer from the railway station of Sio-Fok. Its weakly mineralised waters might be classed in the sulphated alkaline, in the earthy, or in the chalybeate group, but, considering their probable mode of action, are most conveniently classed in the present group, to follow the simple acidulated and other weakly mineralised waters. The favourite well used for drinking is the gaseous 'Franz-Josephs-Quelle' in the Kurplatz, which contains about ·8 per mille each of carbonate of calcium and sulphate of sodium, ·11 per mille of carbonate of sodium, ·01 per mille of bicarbonate of iron,

and 1,207 per mille volumes of carbonic acid gas. The weakly mineralised waters of the lake (containing 54 volumes per mille of carbonic acid gas) and the mud from its banks are both used for baths. The season is from May 15 to September 15.

Fideris (in Switzerland, Grisons) must likewise be mentioned in this chapter. It lies at an elevation of 3,460 feet in the Praettigau valley, and its cold gaseous waters contain only a minute quantity of iron (·01 per mille of the bicarbonate) and a total of under 2 per mille solids. (See also Chapter XII.)

Rappoltsweiler in Upper Alsace is situated at an altitude of 920 feet at the foot of the Vosges Mountains, $2\frac{1}{2}$ miles from the railway station. The Carolaquelle (62·5° F.) is a weak earthy water with a total solids, according to R. Fresenius and E. Hintz, of only 1·79 per mille. The water is used for drinking, inhalation, baths and douches; likewise for a swimming bath.

Kislovodsk (Russia) is a small town situated at an altitude of 2,700 feet in the Caucasus, fourteen miles to the south-east of Essentuki (*q.v.*). It is a climatic health resort open throughout the year; according to Dr. F. G. Clemow there are said to be a large number of fine sunny days in winter, though snows and fogs must be occasionally expected; the thermometer is on an average below the freezing point in December, January and February, but may rise in the sun to 55° or 60° F. during the middle of the day. Some Russian physicians send phthisical cases to this place.

Its chief mineral water is the cold weakly mineralised alkaline-earthy Narsan spring, which, according to Zalieski's analysis, contains a total solids of only 1·7 per mille (·8 calcium carbonate).

CHAPTER XVII

MARINE SPAS AND HEALTH RESORTS

Sea bathing

The sea is really a mineral water, and sea baths act in the same way as the inland fairly strong salt or brine baths, called by the Germans 'Soolbäder' (Chapter VII.). There are, however, important differences between the 'Soolbäder' and sea baths. In sea bathing, or, as it usually is, 'surf bathing,' there is the charm and freshness of bathing on the open sea shore, and there is the mechanical stimulation on the skin by the impact of the waves and movement of the water. This is absent in the Soolbäder (unless, indeed, the waves be artificially imitated); these rather resemble the taking of warmed sea-water baths in closed rooms, which is often preferable to open air bathing in the case of weakly children and very delicate and timid people. Sea bathing may aggravate an eczematous eruption or bring out an urticarial or other rash,[1] or in some cases may be followed by headache or too great a feeling of fatigue; in such cases it should be abstained from temporarily or permanently, or else baths of very short duration (always to be recommended at the commencement of a course) should be tried; or possibly baths of warmed sea water (similar to ordinary Soolbäder) taken in the house may be found suitable to begin with. Even persons in fairly good health, but unaccustomed to sea bathing, should be

[1] Skin eruptions from sea-bathing may be due sometimes not so much to the immediate action of the bath, as to subsequent irritation caused by particles of salt left behind in the interstices of the epidermis after drying the body.

recommended not to bathe in the open sea before breakfast without taking a little milk, or a cup of coffee and a biscuit first of all. This precaution must of course never be neglected by invalids, and bathing in the sea after a tiring walk should likewise be avoided.

Internal use of sea water

Although the internal administration of small doses of diluted sea water has been occasionally advocated and sometimes carried out with apparent good results, the unpleasant taste is not likely to render the custom at all general or 'fashionable.'

Difference in sea waters

Practically, therefore, sea water is only used in the form of baths. It makes, however, some difference which sea water is used, for the amount of solids contained in water from the Baltic is less by half, and that from the Mediterranean is slightly greater than that from the German Ocean or Atlantic, which contains about 3 per cent. of common salt. Sea water from the Baltic is consequently less stimulating than from the Mediterranean or Atlantic.

Sea air and the action of marine health resorts

Much of the effect of the seaside depends on the 'freshness' of the air, owing to the constant breezes. During the daytime the surface of the land gets heated more than that of the sea, the hot land heats the lower layer of air, which becomes lighter and rises, its place being taken by the cooler air from the sea; hence the prevalence of sea breezes during the heat of the day. After sunset the surface of the land cools down more rapidly than the surface of the sea; hence the prevalence of land breezes in the evening. It is this perpetual movement in the air that makes the seaside so enjoyable during the heat of summer, and gives it a certain bracing effect which is useful to those who are debilitated from overwork and to convalescents. A certain amount of the effect of seaside residence may be due to the presence of minute particles of brine in the air (derived from sea spray) and to the presence of a greater amount of ozone than in the air of ordinary inland localities. There are some people who become 'bilious' and con-

stipated from the effect of sea air, especially at the more bracing places, and for whom simple country air or mountain air is likely to be more useful. In many cases, however, this inconvenience may be avoided by diminution of food, and increase of excretions through the influence of aperient waters or drugs.

Seaside treatment is very serviceable in the treatment of scrofulous, rachitic, and weakly children, especially in the so-called torpid kind of cases; even tuberculous affections, in which surgical interference is necessary, perhaps do better when operated on at the seaside than in the hospital of a large town. In many different classes of debilitated or anæmic patients the seaside is likely to be of use with or without special treatment. In atonic dyspepsia and in functional nervous affections without much irritability great benefit can often be derived from seaside treatment. In chronic gastric catarrh and irritable dyspeptic conditions sea bathing and bracing seaside localities are not suitable; they may aggravate the complaints of erethic individuals. In all cases much attention must be given to the separate tendencies of the individual patients, as well as to the affection from which they suffer or have been suffering.

The more bracing localities are of course more suited for those individuals who retain tolerably good power of reaction to cold, whereas the milder climates are suited to those with little power of reaction and to patients of very irritable nervous temperaments.

It is doubtless owing to the improvement of the general health, by sea air and sea bathing, that some marine health resorts have acquired a reputation in cases of impotence. It is thus also that sea bathing may cure leucorrhœa and amenorrhœa, associated with a torpid type of anæmia, and may apparently sometimes overcome sterility; in fact, many different affections, when partially or wholly due to a depressed state of the general health, may be cured or relieved by seaside treatment.

Selection of a marine health resort

There are questions of varying importance to be considered in the suitability of seaside places, such as the character of the shore and its convenience for bathing, the position of the place, its surroundings, and its climate at different seasons of the year ; and, lastly, its accommodation, hygienic arrangements, and the amusements afforded to visitors.

The bracing seaside places on the eastern coast of England differ considerably from Torquay, Falmouth, and the other less bracing south-western coast localities. The Baltic spas have climates of a less marine character, and the Baltic sea water has a less stimulating action, whilst the Mediterranean spas have warmer climates, warmer bathing, and usually slighter waves.

Each place has its advantages for different invalids, and in some cases its disadvantages. Sometimes the shore is precipitous, or there is not sufficient beach for bathing, sometimes the sandy shore is so level and extensive that persons bathing have to go a considerable distance out, in order to reach a sufficient depth of water to cover the body—a circumstance not without its advantages in the case of children. Sometimes there is a considerable descent from the houses to the shore, so that unless special arrangements exist, invalids may find the getting up and down hill between their houses and the sea tiring. The accommodation may at times be hardly sufficient for the sudden influx of visitors. Whilst some spas are too crowded, others are described as dull and without amusements. There may be disagreeable smells, or the drainage arrangements may be defective, but this is less likely to be the case in England than in other countries.

England is notorious for the trouble bestowed on drainage, and the freedom of its towns from disagreeable smells ; but it must be owned that at such a popular seaside health resort as Margate the smell which comes from the harbour during low tide, on a hot day, is anything but agreeable, though it need not necessarily be due to defective drainage arrangements.

The main points to be considered in selecting a marine health resort are the climate, the hygienic arrangements, and the surroundings. The time of year must likewise be considered; many of the fresh bracing seaside places of great use in summer are too cold for invalids in winter. If, therefore, a patient applies for advice in winter, a milder health resort has to be recommended, though in summer and autumn a more bracing locality might have to be suggested to the same person. Different portions of the same sea-side place may present different advantages and disadvantages. One quarter of the town may be nearer the sea for bathing, or may be better sheltered from winds, or may get more sun than another quarter. Even different houses and hotels in the same quarter may have advantages in position, the one over the other, so that local advice, as from a resident medical man, is often desirable for selecting the place of residence.

Classification

The most convenient classification of marine health resorts is that by the main characteristics of their climate; in the following pages they have been roughly arranged according as their climate may be termed relatively dry or moist, and warm or cold, into three groups: namely: (1) warm dry places, (2) warm, and (3) cool places of greater relative humidity.

Warm dry marine places

Amongst the *warm dry marine* health resorts the most important and well known are those of the Western Riviera, including St. Raphael with Valescure, Hyères with Costebelle, Cannes with Cannet and Grasse (the latter at an altitude of about 1,000 feet, nine miles inland from Cannes), Antibes, Nice (with Cimiez), Villafranca, Beaulieu, Eze, Monte Carlo, Cap Martin, Mentone, Bordighera, Ventimiglia, Ospedaletti, San Remo, and Alassio. In spite of the frequency of winds, clouds of dust, sudden changes of temperature, and evening fogs, those who require more sunlight, warmth, and dryness of air than they can get in their own country, often gain appetite, and become healthier in mind and body, by residence at one of these

places. The best time of year for these localities is generally from the end of October to the end of April. Their mean winter temperature varies for different years, but may be taken as about 50° F. Amongst invalids likely to be benefited on the Western Riviera are: delicate patients with low power of resistance, including some of those affected with chronic or quiescent pulmonary tuberculosis, or with catarrh of the respiratory or intestinal mucous membrane, or suffering from the remains of pulmonary affections; gouty and rheumatic patients extremely sensitive to cold and damp; lastly, those whose power of resistance is temporarily or permanently very much lowered by previous disease, injuries, or by premature senility. As in all cases of disease, so here it is not the nature of the disease which has exclusively to be considered, but the individual peculiarities and tendencies of the patient. Erethic subjects of pulmonary tuberculosis who are harassed by a dry nervous cough, laryngeal irritability, or in whom every slight cold produces a febrile temperature, generally do better in moister and more equable climates, such as Ajaccio, Algiers, Pau, and Arcachon. For neurotic patients and those suffering from neuralgic conditions, neighbouring more elevated regions are mostly preferable, such as Grasse and Cimiez.

Costebelle, which consists only of hotels, is beautifully situated on the south slope of a hill covered with pine and 'maquis,' and tolerably protected from the north-west, but less so from the north-east wind; the latter, however, prevails not so frequently, and acts on the whole less injuriously at this part of the coast than the 'mistral' or north-west wind. Hyères is not so well sheltered, though it has increased in size, and possesses much improved hotel accommodation. St. Raphael is much less protected from the winds, and Valescure has not developed as it was expected to do. Many boulevards and villas which had been commenced at Valescure have remained uncompleted; the pine trees are too

much scattered to afford protection, and although the Estérel Hills afford a slight protection from the north-east, the place lies fully exposed to the 'mistral.'

In the last twenty years Cannes has grown enormously as far as hotels and villas are concerned, particularly in the eastern quarter, where the houses stretch out for two or three miles amongst the pine trees on the slopes of the hills towards Antibes. The water supply and the drainage are much improved. Grasse, whose beautiful position somewhat reminds one of Les Avants near Montreux, is sheltered by considerable heights from the west, north-west, north, and north-east; the air is fresh, the views and walks are delightful, and the accommodation at the Grand Hotel in the highest part of the town, 1,100 feet above sea-level, is good. Many cases of neuralgia and asthma find relief from these complaints, which had been aggravated at the sea-shore. [In the hills, four and a half hours to the north-west of Grasse, is Thorenc, nearly 4,000 feet above sea-level, a summer health resort, near to a pine forest, which is in process of development, and may turn out of great value to invalids at the Riviera.]

Nice, though the greater part is much exposed to winds, has, like Cannes, enormously increased in size during the past twenty years, and the appearance and hygienic arrangements are likewise improved. Cimiez especially has been further developed, and is found by most nervous people less exciting. Beaulieu, on the railway between Nice and Monte Carlo, is a small strip of land between the sea and high rocks, which shelter it from the N.N.E., and partly from the north-west. With the sole exception of the eastern bay of Mentone, Beaulieu and Eze are the most sheltered spots on the Riviera, and the irradiation by the sun's rays reflected from the rocks has procured for Beaulieu the name of 'Petite Afrique.' The very limited strip of ground around the railway station of Eze (Italian Eza), the next station on the way to Monte Carlo, is, if anything, still

more sheltered than Beaulieu; behind it, the old robber's stronghold of Eze forms a most picturesque object, crowning the steep rocks, about 1,300 feet above sea-level.

Cap Martin, between Monte Carlo and Mentone, possesses now one of the best situated and best arranged hotels on the Riviera. It lies at an elevation of about 150 feet above the Mediterranean, and is surrounded by a large pine forest with an undergrowth of rosemary, myrtle, lentiscus, and cistus. It has the great advantage of being as good as free from dust, and exercises a more soothing influence on the nervous system than does either Mentone or Monte Carlo. The pine forest with its undergrowth gives shelter from wind and sun, and fragrancy to the air. At present it cannot be regarded as a good health resort for serious pulmonary cases, on account of the large element of mere pleasure-seekers amongst the visitors; but there are good sites in the fir plantations for other establishments, which may be turned to greater advantage for invalids.

Bordighera has grown much in the last twenty years, but has retained its old character of a quiet health resort. The hotels and villas which lie away from the sea, in the olive plantations, have more shelter and less dust. The villas of the neighbouring Borghetto (usually included under the name Bordighera) are those best protected from the wind. The air of Bordighera is on the whole fresher than that of Mentone and San Remo.

In San Remo many new hotels and villas have made their appearance, as well in the eastern as in the western portions of the town, partly perhaps since the late Emperor Frederick made a trial of the climate. A mild summer health resort is going to be opened at Ormea (2,460 feet above sea-level), about five hours' drive by a good carriage road from Oneglia, a railway station between San Remo and Alassio. Alassio has not much increased in size, though for many invalids it is preferable to San Remo. The old town proper lies quite close

to the sea, but the surrounding semicircle of hills, especially the slopes facing the south and south-west, afford good sites, which are warmer in winter and cooler in summer than the level ground on which the old town stands.

Sorrento and Castellamare, in the beautiful Bay of Naples, though probably too hot for most natives of Northern Europe in the height of summer, are delightful in the spring and autumn. Sea bathing can be had at both places, and at Castellamare there are likewise the alkaline muriated springs (Chapter IX.). The islands of Ischia and Capri are rather too much exposed for winter residence. Naples is much exposed to the Tramontano, but has become much healthier since the drainage has been improved and the overcrowding in the poorer quarters diminished, and especially since the town has been supplied (1885) with pure water from the Serino springs, which in Roman times were used for the famous Claudian Aqueduct. The almost equally beautiful and famous Salerno is unfortunately still open to suspicion as to hygienic arrangements, and the malarious air from the marshes near Pæstum at times reaches it. La Cava dei Tirreni (see Chapter XVIII.) is more healthy. It lies inland, six miles from Salerno, on the railway to Naples, and is a favourite spring, summer and autumn resort, though said by Dr. Johnston-Lavis to be windy, cloudy, and dusty in the winter. Amalfi, on the northern shore of the Bay of Salerno, about twelve miles from the city of Salerno, has an exhilarating and healthy situation. Though very sunny in winter, it is only partly sheltered from the north.

To this class of health resorts belong also several on the Mediterranean coast of Spain. Amongst these may be mentioned Barcelona, and the warmer Alicante, and Malaga. The latter has a dry sandy soil, a south-eastern aspect, and is protected by a semicircle of mountains from the north and north-east winds, but is exposed to

the biting dry north-west wind. Valencia belongs rather to the more humid climates.

The warmer marine places of greater relative humidity

Amongst the *warmer* localities of greater relative humidity some of the least humid ones are the towns of the 'Eastern Riviera': Viareggio, Spezia, Chiavari, Rapallo, Santa Margherita, and Nervi. These places, excepting Nervi, are somewhat less sheltered from the cold winds, and have a relatively higher humidity than the localities previously mentioned in the 'Western Riviera.' Nervi is the only really sheltered spot in the Eastern Riviera, and offers as great natural advantages as almost any locality of the Western Riviera. Most of the place is private property of rich Italian noble families, but the Eden Hotel, well situated on the slope, affords good accommodation to the visitors (who are chiefly Germans). One of the principal features of Nervi is the walk along the picturesque rocky coast, well sheltered and entirely free from dust. It is perhaps the finest walk at any marine spa in Europe, and it is due in a great degree, we understand, to the exertions of Dr. Schetelig.

Pisa now lies a few miles inland, and hence its climate is not strictly marine. Genoa is windy and rainy, but Pegli, about six miles west of Genoa, has a more equable and sheltered climate, though it has a greater relative humidity than the localities further west, that is, in the Western Riviera proper. Patients who have wintered in the Western Riviera may stay at Pegli in spring on their way to the Swiss or Italian lakes.

Venice is not so warm as either of the Rivieras, and is not sheltered from the cold north wind. It does not quite deserve its former reputation in phthisis, but its freedom from dust is a great advantage, and cases of arrested phthisis with a tendency to irritable cough, and some cases of nervous irritability, may be recommended to Venice, especially in March and April, when other places have also great defects. Rheumatism is very

prevalent in Venice, and it is absolutely necessary for invalids to avoid rooms near the ground-floor or deprived of direct sunlight. The Lido island, which may be regarded as part of Venice, has good arrangements for sea bathing, and would be an excellent marine health resort, if it were quite free from malaria.

The places on the Austrian Adriatic coast have a higher relative humidity and are rather colder than the Riviera localities. Their climate is more changeable, and most of them are subject to disagreeable winds, especially the cold 'Bora,' worst in winter and early spring. Abbazia on the east coast of the peninsula of Istria is a rising health resort, with tolerable shelter and good hotel accommodation. It is kept open during the winter as well as during the bathing season. Further south are Cirkvenica, and the islands of Lussin, Lissa, and Lesina. Ragusa is very beautiful and interesting to visitors, but is unfortunately rather exposed to the sirocco.

Amongst the Ionian Islands the town of Corfu, though too hot in summer and rather uncertain in winter, offers many advantages in spring and autumn, which are enhanced by the great beauty of the scenery and the exhilarating effect of the sky. Zante has a similar climate, but the accommodation is less good.

Sicily possesses many delightful localities which can be rendered useful to invalids, though they can scarcely claim to have perfect climates. Palermo, Catania, Syracuse, and Acireale (see Chapter XIV.) are too hot in summer for natives of northern regions, and are in winter sometimes much exposed to winds. Their cheerful character, however, acts favourably on the nervous system, and thus counterbalances the disadvantages (winds and dust), except in the case of the most delicate invalids.

Girgenti (the ancient Agrigentum) will some day, when better accommodation has been provided, take a prominent place amongst this class of health resorts, but, with regard to beauty, all must yield to Taormina

(the ancient Tauromenium), which is situated on the eastern coast, on an abrupt hill, about 380 feet above Giardini, a station on the railway between Acireale and Messina. The hill on which it lies is in continuation with the north-eastern slopes of Mount Etna.

If we compare the winter climate of Sicily with that of other wintering stations, we find according to the 'Lancet' special commission of 1897,[1] that the mean monthly temperature for January is 51·6° F. at Palermo, 49·5° F. at Catania, 39·6° F. at Bournemouth, 41·6° F. at Ventnor, 40·8° F. at Torquay, 47·0° F. at Nice, 49·0° F. at Mentone, 47·2° F. at San Remo, 53·6° F. at Cairo, 59·6° F. at Orotava (Canary Islands). On the whole, the winter climate of Sicily, as represented by Palermo and Catania, is warmer, moister, and more equable than that of the French and Italian Rivieras; it is colder, moister, and more equable than that of Cairo, and is colder, less moist, and probably less equable than that of Orotava.

Ajaccio, in the island of Corsica, faces the south-west, is sheltered from cold winds, and is favoured by its freedom from dust and mosquitoes; there are beautiful walks and drives to be enjoyed in the neighbourhood, the roads are excellent for excursions, the accommodation is good, and the people are friendly. In regard to Ajaccio the situation on granite, the absence of dust, the shelter from wind, are specially to be noted, as well as a peculiar aromatic condition of the air, due to the dense 'maquis' covering all the surrounding hills. The 'maquis' or Corsican 'bush' is composed chiefly of arbutus, cistus, lentiscus, myrtle and heath. One can well imagine how Napoleon, when at St. Helena, said that he would recognise Corsica with shut eyes, by the aroma of the air.

Valencia belongs to the rather humid localities, and not to the drier group, like some other places on the

[1] For further information about Sicily, see the interesting articles in the *Lancet* (June, July, August, 1897) on 'Sicily as a Health Resort.'

east coast of Spain previously mentioned. Its mild and equable climate is to some extent spoiled by the irrigation of adjacent rice-fields.

The climates of Lisbon and other towns, on the western coast of Spain and Portugal, are too changeable to render them suitable spots for invalids to stay at.

Biarritz and St. Jean-de-Luz in the south-west of France, on the coast of the Bay of Biscay, are exposed to the prevailing winds, and are bracing to most persons. Though there is much rain, the air rarely seems damp, owing to the dry soil rapidly absorbing the rain. They are pleasant autumn and spring resorts for bathing, and are to be recommended in cachectic conditions from long residence in hot climates, in many patients without organic disease, and in certain hypochondriacal conditions. Arcachon, further north, about nine miles from the actual coast, lies in a pine forest, at the south of a large basin of salt water, connected by a narrow channel with the sea. According to Dr. Burney Yeo its climate is mild and soothing, and is especially suitable to cases of irritable bronchial or laryngeal catarrh, and to cases of phthisis with tendency to congestion or inflammatory complications. However, though the mean winter temperature is about 46° F., its climate is less equable and sedative than that of its neighbour Dax. There are two parts of Arcachon, the summer town adjacent to the water and therefore somewhat more convenient for salt water bathing, and the winter town with its villas amongst the pine trees which cover the adjacent sand hills. The vast extent of low-lying country around Arcachon is almost entirely planted with pines, which help to fix the formerly bare sandy soil and prevent the encroachment of the sea.

The cooler marine places of greater relative humidity

Amongst the *cooler* localities of greater relative humidity must be included the numerous marine spas of Great Britain and Ireland, and those on the north-west and north coasts of France, and on the coasts of Belgium, Holland, and Germany.

The climate of Great Britain and Ireland is made warmer than other countries of the same latitude by the Gulf Stream and by moist winds warmed by warm currents in the Atlantic Ocean. The rainfall, though the total amount need not be greater, is more equally distributed over the different seasons and therefore occupies a greater length of time than in more southern countries. The clouds so common in the British sky, whilst they to some extent keep off the warmth and light of the sun during the day, check the loss of heat by radiation during the night, and so tend to equalise the night and day temperatures, and prevent the chilliness so often felt at sunset in the warmer and brighter Riviera. The hygienic conditions and accommodation at English seaside places are, moreover, usually very good, an advantage that they possess over many foreign places.

There is a considerable difference between the climate of the west and south-west coast, and that of the east and south-east coast of England; the latter are colder and drier than the former, whilst the main part of the south coast combines the relative dryness of the latter with the relative warmth of the former. It is in winter that the difference in temperature shows itself chiefly; hence some of the warmer seaside spas may be chosen as winter health resorts. Some of these will be mentioned first.

Queenstown, in Cork Harbour, Ireland, is well sheltered from the north, and is as warm as Torquay in Devonshire. Glengarriff, beautifully situated on the south-west coast of Ireland in Bantry Bay, has a similar climate. According to Dr. D. E. Flinn, the mean annual temperature of Glengarriff is nearly 52° F., and therefore slightly higher than that of Torquay, Ventnor, or Bournemouth. The mean winter temperature is 45° F. Parknasilla in Kenmare Bay, with Valentia and the rest of the Waterville Promontory, has the highest mean temperature in Ireland, namely 52° F. According to Dr. R. H. Scott, the average daily variability at Valentia

is only 1·9° F., whereas it is 2·7° F. in London. In the east of Ireland, Rostrevor is recommended by Dr. Flinn as a winter and spring resort. It is picturesquely situated on the northern shore of the Carlingford Lough, and sheltered to the north and east by the densely-wooded Mourne Mountains.

Rothesay, in the island of Bute, is amongst the places on the west coast of Scotland which enjoy a comparatively mild winter climate.

The Scilly Islands have been said by Dr. Tripe to possess 'the most equable winter temperature in the British Islands, if not in all Europe.' Penzance and Falmouth, in Cornwall, have a very equable climate, though not so well sheltered from the winds as Torquay in Devonshire. Falmouth has been alluded to by Sir E. Sieveking[1] and Sir Joseph Fayrer,[2] who have personal experience of its climate, in terms of high commendation, and Dr. W. H. Dickinson[3] prefers it to any other place in England as a winter resort for chronic renal cases. Torquay is said to be drier than other places of South Devon. The parts of Torquay, further up the hills, away from the sea, are less relaxing than the part nearer the sea.

Teignmouth has not such an equable climate as Torquay, and is not sufficiently sheltered for winter residence. Dawlish is more suited as a winter residence for invalids, but owing to east winds is less serviceable during the spring. The new portion of Exmouth is fairly sheltered, but subject to occasional river fogs. Budleigh-Salterton, about 4 miles east of Exmouth, has more shelter from the north than Exmouth, but limited space for sheltered walks.

Sidmouth is almost as well sheltered as Torquay, and has great advantages as a winter health resort. The new bath establishment at Sidmouth offers

[1] *Brit. Med. Journ.*, December 14, 1889.

[2] *Brit. Med. Journ.*, August 29, 1896.

[3] Allbutt's *System of Medicine*, vol. iv. p. 402.

facilities for warm sea-water baths, &c.; the 'Aix douche-massage' and the 'Nauheim treatment' of heart affections are likewise said to have been introduced there.

Salcombe, owing to its protected position, is one of the warmest spots in England, but the walks for invalids are too limited. Many other places on the south-west coast might be mentioned in this group, as well as Lynmouth, Lynton, Ilfracombe, and some other towns on the north coast of Devonshire and Cornwall.

Two of the most important winter health resorts on the coast of England are Bournemouth in Hampshire, and the Undercliff of the Isle of Wight. Bournemouth (which includes Boscombe), on account of its plantations of pine trees, has been compared with Arcachon in France. There is more wind at Bournemouth than at Torquay, but the place is tolerably sheltered from the north, north-east, and, to some extent, from the east winds, and the air is less relaxing than at Torquay. The sand and sandstone on which the town is built absorb the rain and help to keep the atmosphere fairly dry. The popularity of Bournemouth as a health resort and as a wintering place for patients with pulmonary and bronchitic troubles is witnessed to by the enormous extension of the town along the coast in recent years. The neighbouring Branksome is practically a continuation of Bournemouth.

The Undercliff of the Isle of Wight is a kind of terrace extending for about six miles in length, from near Bonchurch to Blackgang Chine. The warmth of the sun is increased by reflection from the cliffs and the sea. The soil is of chalk and sandstone, absorbing water, and so leaving the surface dry. Its position is sheltered from the north, north-east, north-west, west, and partly from the south-west. The scenery is beautiful, and the climate is mild and equable, yet fairly dry, and not relaxing. It is often suitable in early stages of phthisis, and in chronic catarrhal conditions of the

respiratory organs, in some scrofulous, anæmic, and debilitated conditions, and in slow convalescence from acute diseases. The good repute of this portion of the Isle of Wight has been confirmed by the satisfactory results of the Royal National Hospital for Consumption at Ventnor.

Pwllheli, in Cardigan Bay, has some claim to be considered a winter resort, owing to the shelter afforded by the mountains. Hastings and St. Leonards in Sussex, and Llandudno in North Wales, are best known as summer resorts, but might be used as winter resorts by those able to bear a certain amount of cold wind. The same may be said of Barmouth in Merionethshire.

The places in the British Islands suitable for seaside residence in summer are almost too numerous to be mentioned. Their winter climate is colder than those previously mentioned; in their summer climate they differ less. In Scotland a few such places may be mentioned:—Nairn on the Moray Firth, Broughty Ferry on the Firth of Tay, the University town of St. Andrews, Portobello near Edinburgh, North Berwick and Dunbar. Beginning from the north, in Yorkshire, we have Redcar, Saltburn, Whitby, Scarborough, Filey, and Bridlington. In Lincolnshire, Skegness is useful for the manufacturing towns of that part of England. In Norfolk and Suffolk: Hunstanton, Wells, Cromer, Great Yarmouth, Lowestoft, Aldborough, and Felixstowe. In Essex: Walton, Clacton, Southend. In Kent: Herne Bay, Birchington, Westgate, Margate (with its well-known Royal Sea-Bathing Infirmary[1]) and Cliftonville (the 'East Hill' portion of Margate, the highest and probably the healthiest part of the town), Broadstairs, Ramsgate (with the adjoining St. Lawrence), Deal, Walmer, St. Margaret's Bay, Dover, Folkestone, Sandgate, Hythe. The towns mentioned after Dover are to

[1] This was founded in 1791. It is probably the earliest marine anatorium for the poor in Europe.

some extent sheltered from the north, and are warmer than the east coast localities.

We now proceed westwards along the south coast in our enumeration: Hastings with St. Leonards, Bexhill, Eastbourne, Seaford, Brighton,[1] Worthing, Littlehampton, Bognor, and come to the various seaside towns of the Isle of Wight not included in the Undercliff, *i.e.* Shanklin, Sandown, Sea View,[2] Ryde, Cowes, Yarmouth, Alum Bay, and Freshwater. Further west along the main coast are Southsea, Lymington (rather relaxing), Swanage, Weymouth, Lyme Regis, and the places already mentioned as variously suitable for winter residence. In many of these much depends on the position of the house in the town, different portions of the same town being more sheltered from cold winds than others, and the sea air being most felt in the parts nearest the sea.

The sea air is more felt in the Channel Islands than in any of these places. In fact some localities in the Channel Islands have a pure marine climate somewhat approaching that of the Scilly Islands.

Along the north coast of Cornwall, Devon, and Somerset, we have New Quay, Bude, Westward Ho, Barnstaple (eight miles from the sea), Ilfracombe, Lynton, Lynmouth, Minehead, Weston-super-Mare and Clevedon. The three latter, on the Bristol Channel,

[1] Brighton has not been mentioned amongst marine stations for winter on account of its want of shelter from the east, which, in the case of invalids, renders special precautions necessary during the months of February, March, and April. The north wind may likewise be very unpleasantly felt, except in the so-called 'Madeira Walks,' which are sheltered by the sea-wall. From late autumn to January, Brighton may be a good situation for invalids, but it is not likely to become a real winter health resort, unless some sort of large winter garden or 'glass-palace' be erected, with complete protection from the east, north, and north-west, so that invalids can daily spend four to six hours in it, and take their exercise there.

[2] At Sea View, as well as at one or two other marine spas of England, ladies and gentlemen can dress in tents on the beach as at foreign marine spas. At Sea View there are no bathing-machines.

have the disadvantage of large muddy sand-fields during low water, but have beautiful walks; their climate is less fresh than that of the north coast of Cornwall, but rather more bracing than that of Torquay.

On the coast of Wales there are Penarth near Cardiff, Porthcawl, The Mumbles near Swansea, Tenby, Aberystwith, Barmouth (already mentioned), Criccieth, Pwllheli (already mentioned), Beaumaris (in the Isle of Anglesea), Penmaenmawr, Llandudno (already mentioned), and Colwyn Bay and Rhyl.

Further north than Wales one comes to New Brighton, Southport, Blackpool, Fleetwood, and Grange in Morecambe Bay, the latter in a beautiful and sheltered position. Silloth, in Cumberland, on the Solway Firth, has a mild and comparatively dry climate. Douglas and Ramsey, in the Isle of Man, have naturally a completely marine climate, being situated in the midst of the Irish Sea.

On the west coast of Scotland there are Ardrossan, in Ayrshire; Largs, Wemyss Bay, Dunoon, and other places on the Firth of Clyde; Rothesay, on the Island of Bute (previously mentioned); and Oban in Argyleshire; all of them very useful resorts for the industrial centres of the west.

On the eastern coast of Ireland: Bray, Kingstown, Howth; Rostrevor (already mentioned); Newcastle in Dundrum Bay; Bangor and Holywood in Belfast Lough; all possess a mild and humid climate. Port Rush, near the Giant's Causeway, and Port Stewart, on the northern coast, are more bracing and less humid. Buncrana on Lough Swilly is a pleasant summer resort with good accommodation. On the west coast Bundoran in Donegal Bay, Westport in Clew Bay, and Kilkee and Kilrush in Clare, are exposed to the influence of the Atlantic. On the south coast, Glengarriff in Bantry Bay, Queenstown and Passage in Cork Harbour, and Tramore and Dunmore near Waterford, may be mentioned; the first two places have already been referred to.

We now come to foreign marine spas belonging to the cooler, moderately humid group. The climate of the north-west coast of France, especially Finisterre, somewhat resembles that of the south-west coast of England, but the north coast of France is drier and more bracing. It is on this coast that many popular summer health resorts are situated, their season being from July to September. Amongst them, beginning from the west,[1] is Dinard; this place is popular with English and American families, as is also the neighbouring interesting old town of Dinan, which does not lie quite on the coast. Further along the coast are Saint-Malo, Granville and Cherbourg. Then come the simple and unpretending Cabourg, Beuzeval, and Villars-sur-Mer, and the more fashionable and expensive Trouville, with Deauville. Further east are Etretat—converted from a small fishing village into a seaside spa by the patronage of French artists—Fécamp, St. Valéry-en-Caux and Dieppe; then Tréport, Berck-sur-Mer (with its sanatoria[2] for scrofulous children), Boulogne and Calais—so well known to the English—and Dunkirk.

On the Belgian coast is Ostend, with its bracing air, unrivalled sands, and fine Cursaal on the 'Digue'; further east are the more recently constituted health resort of Blankenberghe, and the less pretentious Heyst. Smaller and simpler Belgian watering places are Nieu-

[1] The milder and hotter marine spas on the west coast of France, including Le Croisic, Pornic, Les Sables d'Olonne, La Tremblade, Royan, Arcachon, Biarritz, and St. Jean de Luz, hardly belong to this class and are not likely to be selected by the English for the summer season.

[2] This was instituted, 1861–1869, by the 'Assistance publique de Paris.' The 'Œuvre des Hôpitaux Marins' possesses similar hospitals at Banyuls-sur-Mer (Pyrénées Orientales), and at Saint-Trojan (in the island of Oléron). There are likewise sanatoria for children at Saint-Pol-sur-Mer, at Pen-Bron (near Le Croisic), at Arcachon, and at Hyères. Dr. Jules Rochard has pointed out that though these places differ much in their climates, a scrofulous child is better off at any sea-side sanatorium than in the impure air of large towns and ordinary hospitals. A short account of the charitable marine hospitals for children in France is given by Dr. Charles Leroux in the *Revue Philanthropique*, Paris, 1897, No. 3, p. 395.

port-Bains, Middelkerke and Knocke. Scheveningen, in Holland, two miles from the Hague, is one of the best-famed seaside summer resorts on the Continent. Zandvoort, near Haarlem, may likewise be mentioned in Holland.

The German North Sea coast possesses many bracing seaside places, amongst which are the small islands of Borkum, Norderney,[1] Baltrum, Langeoog, Wangeroog, &c., most of them probably little known to English and Americans. The Island of Heligoland, now belonging to Germany, has a thoroughly bracing marine climate and good bathing, and is much visited by North Germans. Further north are the Schleswig islands of Foehr and Sylt, with the marine spas of Wyk and Westerland respectively; Sylt possesses likewise a chalybeate spring. On the mainland of the North Sea coast Germany likewise possesses several little summer health resorts. Dangast, in Oldenburg; Cuxhaven, at the mouth of the Elbe; and Büsum in Holstein.

The Baltic spas have the advantage of beautiful forests in their neighbourhood, but are less bracing than the North Sea health resorts. Amongst them may be mentioned Düsternbrook, near Kiel; Travemünde, near Lübeck; Doberan or Heiligen-Damm (with a weak chalybeate spring), and Warnemünde, near Rostock; Sassnitz, Putbus and Binz on the island of Ruegen; Heringsdorf, Swinemünde, Misdroy, Dievenow, Kolberg (or Colberg), Ruegenwalde, Zoppot (near Danzig), and Cranz.

In Denmark, Klampenborg, near Copenhagen, and Marienlyst, near Helsingör, are popular summer resorts. Many seaside places in Sweden and Norway might likewise be mentioned.

[1] At Norderney is the largest of the marine sanatoria belonging to the 'Society for Children's Sanatoria at German Seaside Places.' The Society possesses other sanatoria at Wyk, on the island of Foehr, at Gross-Müritz, in Mecklenburg-Schwerin, and at Zoppot, near Danzig.

Ocean Voyages

Typical marine climates are to be found on the small islands, already mentioned, situated at a good distance from land, such as Heligoland and the Scilly Islands, but during an ocean voyage the pure ocean air is obtained. Its characteristics are considerable humidity and equability, and freedom from dust, microbes, and other impurities. Even within the tropics the ocean air is seldom felt to be oppressively hot, as it might be at the same temperature on land, and the midday temperature is rarely above 85° F. The mean relative humidity is said to be about 73·5 per cent. of saturation.

An ocean voyage should relieve the nervous system by the change of surroundings, the altered mode of life and the freedom from the ordinary cares, excitements and worries of home life. The sea air should increase the appetite, the general nutrition should be improved, and healthy sleep obtained.

Patients who try a long ocean voyage should be tolerably 'good sailors,' not too severely ill, and not too weak. The sleeping-cabins and general accommodation should be satisfactory, and the dietetic[1] arrangements good. There should always be a medical man on the ship whose advice can be obtained when required, and in many cases the invalid should not be allowed to undertake the voyage, unless he be accompanied by a special attendant (as in cases with mental complications) or by a medical man.

As often likely to benefit from an ocean voyage, we may mention cases of overwork and resulting asomnia and depression; prolonged convalescence; threatened consumption and various scrofulous conditions; also the milder and quiescent forms of pulmonary tuberculosis; provided of course that the patients be otherwise suited for the life on the ship.

[1] The difficulty in regard to fresh milk on ships is a possible drawback in the case of patients accustomed to take much milk, notably in some pulmonary cases, and, needless to say, in renal affections.

CHAPTER XVIII

INLAND CLIMATIC HEALTH RESORTS

Although this book, as already mentioned, is intended principally to elucidate the employment of mineral waters and spas in the treatment, prophylactic as well as curative, of diseases and morbid conditions and tendencies, a section on climatic health resorts is necessary, because the use of mineral waters must in the majority of cases be combined with or followed by more or less prolonged stays at different climatic health resorts, specially adapted to the condition of the invalid. Having devoted the preceding chapter to marine health resorts, we will endeavour to give in the present chapter a short survey of the principal inland health resorts of Europe, a survey which makes no claim to completeness, but which can be easily supplemented by the intelligent practitioner. Completeness would be impossible, as well on account of the space it would require, as also on account of the many new places constantly being developed in different parts of Europe.

Classification of inland climatic stations

As elevation above sea-level exercises a predominant influence on the functions of the body, we shall divide the different inland climatic stations into three groups :

I. Localities of high elevation, varying from about 3,500 feet upwards.

II. Localities of medium elevation from about 1,500 to 3,500 feet.

III. Localities of slight elevation, comprising those below 1,500 feet.

We must premise that in this division localities near the limits of the groups may claim with equal right to be placed either in the higher or lower group. Localities of a little less than 3,500 feet may sometimes be placed for various reasons in the first group, for instance, if, on account of the peculiarities of the situation, their influence on the organism resembles more that of localities of a higher elevation, and *vice versâ*. In other cases different parts of a village, comprised in the same name, lie at different elevations; the difference between the lowest and highest parts may be as much as 500 feet and even more.

I. Localities of High Elevation, from about 3,500 Feet above Sea-level Upwards.

Localities of high altitude

The modifications produced by high elevation in the climatic characteristics of places are:

(*a*.) Diminished atmospheric pressure; diminished density, or greater rarity of air.

(*b*.) A lower degree of absolute and relative humidity of the air.

(*c*.) Absence, or great infrequency of mists.

(*d*.) Greater transparency of the air.

(*e*.) Greater diathermancy of the air, owing to which the heat coming from the sun is greater than in lower regions where the air is more humid.

(*f*.) Lower shade temperature.

(*g*.) Greater difference between the temperature in the sun and that in the shade.

(*h*.) Greater purity of the atmosphere from organic and inorganic particles. Absence or rarity of microbes. The presence, probably, of more ozone in the air.

(*i*.) The degree of movement in the atmosphere varies considerably according to position on a slope, or in a valley, or on a plateau. In summer there are regular daily local winds from

the mountains and the valley; but in winter, when the ground is covered with snow, there is comparatively very little wind.

The climates of this group may be designated as eminently stimulating and exhilarating and tonic ('bracing'). They promote the expansion of the chest and lungs, and the ventilation of the latter; they improve the appetite, the digestion, the nutrition and the oxygenation and quality of the blood. Under the diminished atmospheric pressure of high altitudes the number of red corpuscles in the blood rapidly increases, as also the percentage of hæmoglobin, though the latter does so more slowly [1]; the amount of oxygen which the blood

[1] This change in the quality of the blood is regarded by most observers as a vital reaction of the organism to compensate for the diminished barometric pressure at high altitudes. In order that the tissues should still receive their due amount of oxygen the red corpuscles (the oxygen-carriers) of the blood are increased in number to make up for the diminished pressure of oxygen in the lungs. Miescher (*Correspondenz-blatt für Schweizer Aerzte*, 1893, No. 24) suggests that the want of oxygen in the blood stimulates the functions of the hæmatopoietic organs (red bone marrow), and so brings about the reaction—an explanation similar to that suggested to account for the hæmatopoietic reaction which follows acute loss of blood by bleeding. The proportion of hæmoglobin increases under the action of high altitudes more slowly, certainly, than the proportion of red corpuscles, but the observers who have failed to find any augmentation at all in the amount of hæmoglobin, have probably not waited long enough, or have erred technically. The relatively slow increase of the hæmoglobin is doubtless explained by the fact that the newly formed red corpuscles are at first small, and only gradually attain their normal size and richness in colouring matter.

Whether the blood change must be considered as merely a compensatory reaction or as something more, is still unsettled. Certain it is that the proportion of corpuscles and hæmoglobin falls back to the normal soon after resuming residence in low altitudes. It has been argued, because more oxygen is absorbed by the blood, and more CO_2 expired, at high altitudes than at low ones, that therefore the blood change must be something more than a compensatory reaction. Very possibly it may be more than a compensatory reaction in regard to mere diminution of atmospheric pressure; for it may be partly compensatory to the necessity for increased metabolism and heat production at high altitudes. Places at high elevations are mostly colder than places at low levels, and this comparative coldness necessitates a compensatory increase of heat production on the part of the organism—an increase

absorbs is increased (Paul Bert, F. Viault, A. Müntz, F. Miescher, F. Egger, A. Mercier, A. Rollet, P. Régnard, &c.). The specific gravity of the blood and its richness in iron are likewise found to be augmented (Müntz, Viault).

High elevations can be rendered useful in mental and bodily exhaustion arising from overwork, confined air, want of exercise, worry, and the atony of various functions produced by them ; in slow recovery from acute diseases ; in malarious affections ; in tropical cachexia ; in chronic glycosuria ; in nervous polyuria (diabetes insipidus) ; in many cases of asthma ; in some chronic cases of exoph-

probably sufficient to account for the greater quantity of oxygen taken up, and of carbonic acid given off by the blood at high altitudes. This brings us to another question, namely, whether persons have normally a greater proportion of red corpuscles and hæmoglobin in their blood when residing in cool climates than when living in very hot ones. Dr. L. Sambon tells us that according to Rattray, Maurel, Marestang and Eijkman no change can be observed apart from that due to tropical diseases, but, as Dr. P. Manson has kindly pointed out to us, Dr. A. Corre (*Maladies des Pays Chauds*, Paris, 1887, p. 38), says, 'le sang devient moins plastique, moins riche en hématies.' In high altitudes the appetite is often increased, and A. Müntz (*Comptes rendus*, 1891, vol. 112, p. 298) has shown experimentally that increased feeding is in itself a factor in improving the quality of the blood. In all probability the blood change at high altitudes is part of a general law of reaction, namely that when the tissues need an increased supply of oxygen, the blood tends normally to become richer in hæmoglobin in order to supply the want. The need of oxygen which induces such a reaction may perhaps be due to various causes or the combination of various causes:—increased metabolism (exercise, generous diet, cold weather and hydrotherapeutic treatment), diminished barometric pressure (high altitudes) and even delayed circulation (as in certain chronic affections of the thoracic organs).

The whole question of the increase of blood corpuscles at high altitudes is not yet settled. Recently the researches of A. Gottstein (*Berliner Klin. Woch.*, 1898, Nos. 20 and 21), and of E. Meissen and G. Schroeder (*Münchener med. Wochenschrift*, 1898, No. 4), have shown that the chamber of the Thoma-Zeiss hæmocytometer is affected by comparatively slight differences of barometric pressure, and that the supposed increase in the number of red corpuscles observed at high altitudes may, at least partly, be accounted for by this fallacy. It is necessary therefore that fresh experiments be undertaken at high altitudes with an hæmocytometer, such as the one employed by Meissen and Schroeder, specially modified so as to avoid this particular error.

thalmic goitre; in uncomplicated anæmia; in the early stages of pulmonary tuberculosis; in profuse perspiration from weakness of the skin.

The climates of this group, especially the higher localities, are, however, to be avoided in considerable dilatation of the heart with or without valvular disease; in atheromatous and fibrous changes of the heart and arteries; in emphysema of the lungs; in albuminuria; in nervous excitability and insanity.

The following localities belonging to this group deserve to be specially mentioned. They are not arranged by elevation alone, but according to districts, as it is often very convenient to the Doctor to know which are the various suitable localities in a certain region to which the patient can go.

In the Eastern Alps, commonly comprised under the term Tyrol: Sulden and Trafoi in the Ortler district; the Karersee Hotel near the Rosengarten and the Schlern Mountains, five hours distant from Botzen; Hinter-Tux in the Tuxer Thal; Campiglio (Madonna di Campiglio) near Pinzolo; San Martino di Castrozza, Schluderbach, Landro, and Cortina di Ampezzo—in the Dolomites; Toblach, Alt-Prags and Neu-Prags, and Innichen—in or near the Puster Thal; Heiligenblut near the Grossglockner; Brennerbad near the Brenner Pass; Mendelpass above Botzen; Eggerhof above Meran; Fusch in the Fuscherthal; Obladis near the Inn valley; Schrœcken or Schrecken in the Vorarlberg.

In the Eastern part of the Central Alps we have the well-known localities of the Upper Engadine: Pontresina, St. Moritz, Campfer, Silvaplana, Maloja, Sils-Maria, Samaden, Zuz (or Zuoz); and the places in the Lower Engadine: Fettan, Schuls, Tarasp and Vulpera. In or near the Davos Valley: Davos Dörfli, Davos Platz, Clavadel, Frauenkirch, Wiesen. In a branch of the Schanfiggthal: Arosa, consisting of a number of hotels and villas having elevations of from 5,500 to over 6,000 feet, all enjoying considerable shelter from wind; the

higher ones adapted as well for winter as for summer, owing to the large amount of sunshine which they receive even in the shortest months, the lower ones best suited for summer residence.

The Canton of Grisons has likewise : Klosters in the Praettigau, Bernina Hospice Hotel (7,575 feet), Molins (German, Mühlen), Savognin (German, Schweiningen), Berguen, Lenzer-Heide, Parpan, Churwalden, Flims (Flimser Waldhäuser), Disentis ; also Soglio in the Val Bregaglia. On the north side of the St. Gotthard Road, Andermatt and Hospenthal are favourite localities. San Bernardino, on the south side of the Alpine Pass of that name, ought likewise to be mentioned here.

In the central part, on the north side of the main chain of the Alps, we may name : Rigi-Scheideck (Rigi-Scheidegg), Rigi-Kaltbad, and Rigi-First—on the Rigi ; the hotels on the Pilatus ; Mürren ; Wengen, the Hotel Jungfrau on the Wengernalp, and the Hotel Bellevue on the Little or Lauterbrunnen Scheidegg (Sheideck), all at no great distance from the range of the Jungfrau ; Hotel Alpenclub in the Maderaner Thal ; Kurhaus Brünig on the Brünig-Pass ; Engstlenalp ; Adelboden ; Lenk ; Gurnigel ; the Axalp above the Giessbach ; St. Beatenberg ; Rosenlaui ; Grindelwald (the altitude of the last place—3,460 feet—is rather below the lower limits of our high altitude class).

Here we may mention the Weissenstein near Solothurn (Soleure) more bracing, owing to its exposed situation, than would correspond to its mere elevation (4,220 feet).

The mountains along the Rhone above the Lake of Geneva, and the side valleys opening into that portion of the Rhone valley, possess some of the highest and most bracing health resorts of Europe. Amongst them are Zermatt with the Riffelalp and the Lac Noir above it, the Belalp, the Rieder-Furka, the Eggischhorn, the Rieder-Alp, Arolla in a branch of the Val d'Hérens, Saas-Fee, Berisal, the Hotel Bella Tola and Hotel Mont-Cervin

near St. Luc, Chandolin above St. Luc, Hotel Weisshorn above Vissoye, Zinal; and somewhat less elevated, the baths of Loèche (Leukerbad), Montana near Sierre, Evolena in the Val d'Hérens, Champex near the Lac de Champex, in the Val de Champex; Leysin, Villars (or Villars-sur-Ollon) and Chesières with the Hôtel de Chamossaire, Ormont-dessus with the Hôtel des Diablerets, La Comballaz, Château d'Oex, all near Aigle; Les-Plans-de-Frenière and Gryon above Bex.

In the South-western districts of the Alps we may direct attention to the Grand Hotel Morgins in the Val de Morgins, a branch of the Val d'Illiez; to the hotels on the Voirons near the French shore of the Lake of Geneva; Chaumont above the Lake of Neuchâtel; Mont-Revard near Aix-les-Bains. The most tonic place in the Mont Blanc district is the Hotel Montanvert above the Mer-de-Glace, while Chamonix in the valley is much milder and in altitude (3,450 feet) rather below the limit of this group.

On the south side of the great mountain chain there are not so many localities as on the north and in the centre. If we proceed from east to west, we note the following places in order: Santa Catarina and Bormio at the head of the Valtellina; Piora near Airolo on the St. Gotthard route; in the southern Monte Rosa valleys we come to Macugnaga, Alagna, Gressoney-la-Trinité and Gressoney-St. Jean; Andorno in the Val d' Andorno (3 miles north of Biella); above the Lake of Lugano there is Monte Generoso. Further west, to the south of Mont Blanc: Courmayeur, Prolognan, near Brides-les-Bains, and Ceresole-Reale, near the Grand Paradis. Before leaving Italy we ought also to mention Abetone (about 4,500 feet above sea-level), which can be reached by a six hours' drive from the station of Pracchia on the railway from Bologna to Florence, or by a good seven hours' drive from Pistoja. For the sake of convenience we may here also direct attention to Cutigliano, situated in the same region (7 miles from Pracchia), although the elevation is somewhat lower.

In the Vosges Mountains La Schlucht and the Hotel Altenberg above the Münsterthal may be noted. In the south-east of France Thorenc, about 20 miles (4½ hours by carriage) from Grasse (see Chapter XVII.), lies at an altitude of 3,940 feet, near a large pine forest. Panticosa in the Spanish Pyrenees may likewise find a place in this group.

II. Localities of Medium Elevation, between about 1,500 and 3,500 Feet above Sea-level

Localities of medium altitude

The health resorts belonging to this group are characterised by similar qualities to those of the first group, but in a lesser degree. Owing principally to their lesser elevation and greater density of air, their influence on respiration and circulation, on the interchange between the blood and the atmosphere, on the constitution of the blood,[1] on the skin and digestive functions, and on the nervous system is of slighter degree. The less marked action on the skin and digestive organs is partly due to the facts that the temperature of the air is higher, and that the humidity is somewhat greater. These localities may be designated as not quite so stimulating and tonic as those of the first group; but they are better borne by many persons with dilatation of the heart and slight atheromatous and fibrous changes in the blood-vessels, by delicate persons with rather instable nervous systems who are

[1] The researches of E. Veillon (Langenbruck), and Wolff and Koeppe (Reiboldsgruen) make it probable that the blood change noted at high altitudes can likewise be obtained at an elevation of about 700 metres (2,300 feet) above sea-level (see *Correspondenzblatt für Schweizer Aerzte*, 1893, p. 809; *Münchener med. Wochenschr.*, 1893, p. 209; and *Arch. für exp. Pathologie*, Leipzig, 1897, vol. 39, p. 463). Von Jaruntowsky and Schroeder (*Münchener med. Wochenschr.*, 1894, p. 945) obtained this 'reaction' at the still lower elevation of Goerbersdorf (about 1,840 feet). The whole question will however have to be reconsidered, as the experiments of Meissen and Schroeder (*Münchener medicinische Wochenschrift*, 1898, No. 4) at Hohenhonnef, 774 feet above sea-level, show.

apt to become sleepless and lose appetite at high elevations, and also by persons suffering from emphysema of the lungs and albuminuria.

In mentioning suitable health resorts within this range of altitude, we will again proceed from east to west and arrange them not according to elevation, but according to districts, always bearing in mind that the elevation is between about 1,500 and 3,500 feet.

Schmecks (Hungarian, Tatra-Füred), in the Komitat Zips in Upper Hungary, is situated in the beautiful Tatra mountains of the Carpathian Alps, and is one of the chief health resorts of Hungary (see also Chapter XVI.). The altitude of Alt-Schmecks and Neu-Schmecks is over 3,200 feet; that of Unter-Schmecks, twenty minutes distant, is rather less.

Wildbad-Gastein; Semmering on the Semmering Pass, a favourite health resort of the Austrians; Veldes, in Upper Carniola; Velden and Pörtschach on the Wörther See, in Carinthia; Aussee, and Alt-Aussee on the little lake of Aussee; Ischl; Mondsee; St. Wolfgang on St. Wolfgang See; Hallstatt; Zell-am-See; Bruneck; Achensee; Innsbruck and Igls above it; Gossensass to the south of the Brenner Pass; Oetz.

In the Bavarian Highlands and adjacent lakes we mention: Kreuth, Starnberg, Tegernsee, Schliersee, Walchensee, Wallersee, Partenkirchen, Kainzenbad, Garmisch, Oberstdorf, Berchtesgaden.

In eastern Switzerland: Le Prese on the lake of Poschiavo; Promontogno, an intermediate climatic resort in the Val Bregaglia; Seewis, above the Praettigau; Ragatz, and the higher localities of Wartenstein and Valens near Ragatz; Thusis; Gais, Gonten, Appenzell, Weissbad, Heiden, all in the Canton of Appenzell.

In the more central parts of Switzerland: Grindelwald (already mentioned amongst the places of high altitude); Engelberg, Bürgenstock, Seelisberg, Axenstein, Axenfels, Schoeneck, all near the lake of Lucerne; Felsenegg and Schönfels, near the lake of Zug; Weissenburg; Thun; Interlaken; the Giessbach Hotel;

Uetliberg above the lake of Zürich; Macolin or Magglingen in the Jura mountains, above the lake of Bienne, and the Kurhaus Twannberg in the same neighbourhood; Langenbruck, likewise in the Swiss Jura (Canton Basel).

In the south-western parts of Switzerland: Sierre in the Rhone valley; Champéry in the Val d'Illiez, a side valley of the Rhone; Les Avants, Glion, Caux (the altitude, 3,580 feet, is slightly above our limit) and Charnex above Montreux; St. Cergues on the Dôle in the French Jura; Divonne the well-known hydropathic establishment; Monnetier and Mornex on the Salève; Chamonix and Argentière; St. Gervais Village; Les Corbières (near Aix-les-Bains); Brides-les-Bains.

In the Auvergne: Mont-Dore, La Bourboule, Royat, Saint-Nectaire, and Le-Puy-en-Velay.

In the Pyrenees: Cauterets, Bagnères-de-Luchon, Bagnères-de-Bigorre, St. Sauveur, Eaux Bonnes, Eaux Chaudes, Argelès, and Vernet-les-Bains.

In the Vosges mountains: Odilienberg, Hohwald, Drei Aehren, Gérardmer.

In the Black Forest: Höchenschwand, Schönwald, Titisee, St. Blasien, Triberg, Allerheiligen, Freudenstadt, Rippoldsau, Griesbach, Antogast, Wiedenfelsen, Sand, Plaettig, Herrenwiess, all in the Baden Black Forest; and Wildbad in the Würtemberg portion of the Black Forest.

In the Thuringian Forest: Oberhof, Brotterode, Elgersburg, Ilmenau, Ruhla, and Friedrichroda (the last place is slightly below our limit in altitude).

In the mountain ranges of Bohemia: Koenigswart, Marienbad, and Johannisbad.

In the Erzgebirge and Riesengebirge: Reiboldsgrün, Flinsberg, Reinerz, Schreiberhau, and Schmiedeberg.

In the north of Bavaria: Alexandersbad in the Fichtelgebirge and Muggendorf and Streitberg in the Franconian Switzerland.

In the Harz mountains: Clausthal and Andreasberg (or St. Andreasberg).

III. Localities of Low Elevation

Localities of low altitude

The health resorts of slight elevation, viz.: below 1,500 feet above sea-level, act, of course, much less than those of higher situation by rarefaction of the air, and are often much less free from dust and floating organisms. They vary considerably in their other climatic characters and in their influence on the constitution. The degree of latitude, or rather the isothermal line in which a place lies, and still more the average temperature during the different seasons of the year, greatly influence its character as a health resort; but other peculiarities are likewise of great importance, such as the nearness of mountains or of great sheets of water, or of large forests, the situation, whether on the southern or northern, eastern or western, side of a mountain or slope, or on a plateau, the presence or absence of wind, and the direction of the prevalent winds, the exposure to, or shelter from cold winds, the nature of the soil whether permeable or impermeable, the degree of drainage. These and many other points produce great differences in localities of the same elevation. In the northern parts of Europe localities at an elevation of 600 to 1,500 feet are often much more bracing than localities at elevations of 2,000 to 3,000 feet in Italy or in southern Switzerland, especially in and near the lake districts.

Of very great importance is the nearness or remoteness of the sea; for instance, in islands like Great Britain localities at elevations of only 500 to 800 feet, especially when not surrounded by higher hills, exercise a more bracing effect than those of three and four times the elevation in southern Europe. A greater amount of wind and rain and moisture, and a smaller number of sunny days, are circumstances which have to be taken into consideration.

Localities belonging to this group of slight elevation, if they are provided with good accommodation and cheer-

ful surroundings, are most useful as places for change, rest and recreation; these points are to be carefully weighed in the selection of localities for individual cases. We will only mention a few of the localities belonging to this group.

Those on the Continent are principally suitable for spring, early summer and autumn: Salzburg, Gmunden, Ebensee, and other places in the Duchy of Salzburg and the Salzkammergut; Brunnen, Gersau, Lucerne, Weggis (Waeggis) on the lake of Lucerne; Vevey, Montreux, and neighbouring localities, with Mont-Fleuri (above Territet) and Beau Rivage (at Ouchy, near Lausanne), on the lake of Geneva; Zürich and Baden in Switzerland; Locarno, Pallanza, Stresa, Baveno on the Lago Maggiore; Lugano on the lake of that name; Menaggio, Cadenabbia, and the 'Tremezzina' district on the Lago di Como, and Bellaggio on the opposite shore; Varese above the lake of that name; Riva on the Lago di Garda; Bagni-di-Lucca, Perugia and Siena in Upper Italy; and Cava dei Tirreni and Corpo di Cava near the Bay of Salerno.

The following German places can be mentioned here: Alexisbad, Harzburg, Blankenburg, Wernigerode, Ilsenburg, Gernrode, and Ballenstedt in the Harz Mountains; Blankenburg, Tabarz, Tambach and Liebenstein, in the Thuringian Forest; Berneck in the Fichtelgebirge; the Schloss Hotel at Heidelberg; Godesberg near Bonn; Gerolstein, Bertrich, the Laacher See, and Altenahr in the Eifel; Cleve; Wiesbaden; Kœnigstein, Schlangenbad, Schwalbach and Homburg in the Taunus; Bad Boll in Würtemberg; Freiburg in Baden, and Baden-Baden, Badenweiler, Petersthal, Teinach, Herrenalb and some other places in the Black Forest.

In France suitable localities of this class may be found on the lower slopes and outskirts of the various mountain ranges: the Pyrenees, the south-western Alps, the Jura, Vosges, Auvergne, Cevennes, Forez and Morvan Mountains. Many such places have been

described as spas in the preceding chapters. In Belgium we may mention the neighbourhood of Namur and Dinant; there are likewise beautiful and healthy villages in the Belgian, Luxembourg and French Ardennes. In Normandy and Brittany also a number of pleasant old places might be utilised for their pure air.

There are several localities of this class for residence in late autumn and winter. Amongst them we may mention Meran, Botzen, Gries, Arco, Gardone-Riviera, Görtz (Gorizia), Pau, Cambo-les-Bains, and Argelès (the altitude of Argelès is above 1,500 feet, and the place has consequently likewise been mentioned amongst the localities of medium elevation). Some interesting cities, like Seville, Rome,[1] and Florence, are often used with advantage for winter residence.

England, Wales and Scotland are well provided with good localities of slight elevation, and we refer to what we have already said about their bracing character, as compared with similar elevations on the Continent. Many places, though close to each other, vary much in their climates owing to a difference of one or two hundred feet in elevation. Thus Boars Hill and Shotover Hill have advantages over Oxford, and the Gog-Magog Hills over Cambridge, so that families connected with the Universities may with advantage reside at one of these places during the greater part of the year. Similarly many suburbs of London, as Highgate, Finchley, Hampstead, Shooters Hill, Upper Norwood, and Sydenham Hill, can be utilised by Londoners.

In England the following places are suitable as health resorts: Malvern; the district of Clifton near Bristol, and the neighbouring Downs; the neighbourhood of Dartmoor; parts of the South Downs; Buxton and other localities in the Derbyshire Peak district; Ilkley

[1] There is still a common idea that Rome is an unhealthy place, the home of malaria and infectious diseases. Readers of Dr. Mendini's *Hygienic Guide to Rome* (translated by Dr. J. J. Eyre, London, 1897) will find that in reality it is one of the healthiest of large cities in the world.

and Ben Rhydding; Harrogate; and Gilsland. Within a radius of forty miles from London the number of suitable localities is very great, especially in the counties of Surrey, Hampshire, and Kent; amongst them we may indicate the following: Tunbridge Wells, Southborough, Frant and the adjacent hills; Hindhead, Black-Down, Haslemere and Liphook; Frensham Common and Thursley Common, north of Hindhead; Frimley and Chobham Ridges, south of Bagshot; Ascot Heath; Leith Hill with Coldharbour and other places; Holmbury Hill, Hurtwood Common and Wonersh Heath, to the west of Leith Hill; Merrow near Guildford; Farnham Common and Crooksbury Common near Farnham; St. George's Hill and Weybridge; Epsom Down near Epsom, and Banstead Downs near Sutton; various localities on the elevated ground extending from Redhill eastward to Westerham and Sevenoaks in Kent.

Keswick, Grasmere, Ambleside, Windermere, Ullswater, and other localities in the rather moist 'Lake District' are favourite summer resorts on account of their beautiful scenery and opportunities for excursions, boating, fishing, &c.

Wales has many inland places suitable for spring, summer, and autumn residence, and some of them, like the upper part of Llandrindod, have a bracing climate. We need only mention: Llandrindod, Llangammarch, and Llanwrtyd; the Lake Vyrnwy and the Elan Valley Hotels; Llanberis; Llangollen; Trefriw.

In Scotland we have a number of climatic resorts: Braemar, Ballater, Grantown, Carrbridge, Kingussie, Forres, Strathpeffer, Blair-Athol, Pitlochry, Inversnaid, the Trossachs, Crieff, Moffat, Bridge-of-Allan.

In Ireland, most health resorts come under the head of marine spas, but there are some beautifully situated inland localities, such as Killarney, on Lough Leane, which may be visited for an agreeable change and on account of their scenery, especially in the case of persons

where bracing localities are not required or are not well borne. Mallow in county Cork has already been mentioned on account of its subthermal spring (Chapter VI.) and Blarney on account of its hydrotherapeutic establishment (Chapter I.). Enniskerry and Woodenbridge, in county Wicklow, and Dundrum, near Dublin, are mentioned by Flinn as particularly suitable to cases of chest diseases requiring a mild and sedative air. They are situated amidst picturesque scenery and sheltered from cold winds, but would become more suitable for pulmonary cases, if proper sanatorium treatment could be instituted. Such climates alone without the help of thorough medical supervision can do little good in cases of phthisis.

CHAPTER XIX

GRAPE-CURES—MILK AND WHEY CURES—SANATORIA FOR DIETETIC AND SPECIAL METHODS OF TREATMENT, AND SANATORIA FOR PHTHISIS

Grape-cures

Grapes, like other fruits and fruit-juices, possess a limited nutrient power, and exert a certain laxative and diuretic action. Their effect differs in different individuals, and also according to the kind and quality of the grapes employed, especially their comparative richness in sugar. In some cases the use of grapes easily excites diarrhœa and troublesome catarrhal conditions. The cure must be regarded as a derivative one, and is useful in some cases of chronic constipation, abdominal plethora, and chronic bronchitis. In weak persons, especially in those with a tendency to looseness of the bowels, great care must be exercised in the use of 'grape-cures,' and still more so in trials with other 'fruit-cures,' with the exception perhaps of bilberries.

Localities for a grape-cure

Grape-cures can, of course, be most readily carried out at the places themselves, where the grapes used in the treatment grow, provided that the quality of the grapes is good. The quality of the grapes is in some seasons better at one place, and in other seasons at other places.

Amongst the many localities the following may be mentioned: Meran, Botzen with the neighbouring Gries; Arco; Abbazia; Montreux, Vevey, Territet and neighbouring localities on the lake of Geneva; Bex; Interlaken; Gleisweiler; Edenkoben; Neustadt-an-der-Hardt, Dürkheim-an-der-Hardt, Grünberg in Prussian Silesia, Voeslau in Austria, &c.

Milk and whey cures, &c.

Milk is a complete food, which, in many cases, can be digested and assimilated when most other articles of diet disagree or are imperfectly assimilated. Cow's milk, the milk most employed, contains about 4·75 per cent. sugar of milk, 3·5 per cent. butter, 4 per cent. casein and albumen, 0·75 per cent. salts (especially phosphate of lime), and about 87 per cent. water. The milk of goats, sheep, asses and mares is likewise sometimes employed, the two former chiefly in the form of whey. For many persons milk is a most important permanent article of diet, especially for those with weak digestions, the uric acid diathesis, nephritis, cystitis, anæmia, pulmonary phthisis, and various cachectic conditions. Special courses of treatment, during which milk, koumis, &c., constitute the chief or only article of diet, are often useful (sometimes also the alternate employment of a milk diet and of an ordinary diet) in chronic catarrhal conditions of the alimentary canal, nervous forms of dyspepsia in erethic individuals,[1] irritable hysterical conditions, neuralgias, chronic dysentery, psilosis,[2] gouty conditions, the uric acid diathesis, and affections of the liver, kidneys and bladder.

The milk diet besides maintaining the nutrition, sometimes better than any other diet, gives comparative rest to the digestive organs, and acts as a diuretic, clearing out accumulated waste products, and, so to speak, washing out the blood and tissues of the body.

Unfortunately there are some persons who have a great repugnance to milk and others who cannot take it on account of the digestive disturbances it causes, or because, owing to imperfect assimilation, its nutrient power is insufficient.

Often the milk is preferred raw and cold, or tepid from the cow, but unsterilised milk should be taken without boiling it only when it can be obtained perfectly

[1] F. A. Hoffmann (Von Leyden's *Handbuch der Ernährungstherapie*, 1898, vol. i. p. 581) remarks that a pure milk diet is the best remedy against the modern 'Polypragmosyne.'

[2] See *Psilosis or Sprue*, by Dr. George Thin. Second edition, London, 1897, p. 131.

fresh and pure from animals whose freedom from disease is undoubted. When boiled for too long a time the milk becomes indigestible for some persons and the taste is rendered unpleasant; but lightly boiled and taken warm, it is often more easily digested than when taken raw and cold. In the latter state it sometimes causes a disagreeable feeling of fulness and oppression in the epigastrium, and in those inclined to diarrhœa may induce an attack, though the same patients can often take it freely when lightly boiled (warm or cool), sometimes also preferring its taste thus, *i.e.* after being 'scalded,' as it is termed.

Sometimes on account of unpleasant gastric sensations and extreme disinclination the milk has to be taken in only very small quantities at a time; sometimes it is rendered more digestible or more palatable to the patient by the addition of artificial or natural gaseous waters, barley water, lime water, bicarbonate of sodium or common salt; sometimes a little tea, coffee, 'acorn coffee,' or cognac may be mixed with it. Others again can take it better with dry toast or rusks, or in the form of 'bread and milk.'

Skimmed milk, that is milk with much of its fat removed, is better borne than ordinary milk in some cases, and its greater diuretic action is useful in renal affections.

Butter milk contains much less fat and less casein than ordinary milk, and has a slightly acidulous taste owing to the presence of lactic acid and sometimes of a little CO_2; its aperient action may be useful in cases where there is a tendency to constipation.

Whey, that is milk deprived of its casein and most of its fat, consists of the water, milk sugar, and salts of the milk with about one per cent. albumen. The relative percentage of the constituents can, however, be made to vary greatly by the mode of preparation. On account of the salts it contains, its action has been described as analogous to that of a mineral water, and it has a

greater diuretic effect than ordinary milk, and sometimes a slightly laxative action. Whey has had an especial reputation in chronic bronchitis and pulmonary affections, but contains very little nutrient material and is used much less now than formerly.

Koumiss is a drink made by a process of alcoholic fermentation from mare's milk—a kind of 'milk wine' in fact—but in England the true koumiss of the Russian Steppes is imitated by a like fermentation of cow's milk. The kephir of the Caucasus is a drink formed from cow's milk through alcoholic fermentation set up by a special living ferment, the 'kephir grains.' The acidulous taste and the stimulating action of the CO_2 on the gastric mucous membrane sometimes render these drinks agreeable when ordinary milk is objected to. They are used in many cases of anorexia, anæmia, chronic pulmonary diseases, general debility, and various cachectic conditions.

Localities for a milk or whey cure

Gais, Appenzell and Heiden were amongst the earliest localities to get a special reputation for milk and whey cures. Now there are innumerable localities where a cure of this kind can be arranged. We need only mention the following in alphabetical order: Allevard, Les Avants, Badenweiler, St. Blasien, Cauterets, Chamonix, Engelberg, Freudenstadt, Friedrichroda, Gérardmer, Gleisweiler, Interlaken, Ischl, Johannisbrunn, Klosters, Kreuth, Laubbach, Meran, Obersalzbrunn, Rehburg, Reichenhall, Rigi-Scheideck, Roemerbad, Seewis, Streitberg, Teinach, Tharandt, Tobelbad, Weggis (Waeggis), Wilhelmshöhe.

Dietetic Cures and Sanatoria for Special Treatment

The principal reason why the special localities for milk cures are not so highly valued as in former times is because such treatment can be carried out at the majority of health resorts and at home. It must not however be overlooked that the temptation to join in

the usual meals with other visitors is often too great for some patients. The latter difficulty is met with in all dietetic cures, and often makes their use almost impracticable at home and at the ordinary hotels of health resort. It is for this reason that during the last 10–15 years dietetic establishments (including sanatoria for the treatment of diabetes) have been founded in different parts of Germany, such as those, under distinguished guidance, at Heidelberg, Würzburg, Frankfurt-am-Main, Kissingen, Neuenahr, Wiesbaden, Baden-Baden, &c.

Sanatoria for dietetic treatment

Many special sanatoria have likewise sprung up for the treatment of different complaints:—nervous affections, dipsomania and morphinomania, skin diseases, gynæcological affections, &c. Such special sanatoria can be of great service in certain cases, where treatment at home or in hotels is for various reasons difficult.

Sanatoria for the treatment of special complaints

Of even still greater importance than these are the sanatoria for pulmonary tuberculosis which have been erected in different parts of Europe, chiefly in Germany and Switzerland, since the late Dr. Hermann Brehmer introduced this method of treating consumptives by founding his private sanatorium at Goerbersdorf (Prussian Silesia) in 1859. The private sanatorium at Falkenstein in the Taunus, founded at the instigation of Frankfürt doctors in 1874 and opened in 1876, came next, and here Dettweiler, a former assistant of Brehmer, introduced certain modifications in the treatment, especially the various arrangements to enable patients to rest, lying down in the open air, in nearly all weathers, and during the greater part of each day. The excellent results obtained at these two establishments led to the foundation of a number of different private sanatoria in various parts of Europe, mostly conducted by pupils of Brehmer or Dettweiler on very similar lines. We need only mention that of Hohenhonnef on the Rhine (Dr. Meissen), others at Goerbersdorf, Dr. Turban's and another at Davos, other ones at Arosa and Leysin in Switzerland, at Nordrach and St. Blasien, in the Baden Black Forest,

Sanatoria for the treatment of phthisis

at Reiboldsgruen in the Kingdom of Saxony, &c. Of course the newer sanatoria, those built since the tubercle bacillus and its rôle in consumption have been understood, possess certain advantages in regard to facilities for keeping the walls and floors clean, and preventing any possible infection through bacilli contained in the dust of corners, &c.

The results obtained at some of these places prove beyond doubt that even with comparatively indifferent climates great successes in the treatment of pulmonary tuberculosis may be obtained by strict attention to regulations of diet and regimen and the constant personal supervision of each patient. The main characteristics of all such institutions depend on their 'open air' or rather 'pure air' treatment, their diet, and the personal medical supervision of each patient, which comforts him, gives him courage and hope, prevents him overfatiguing himself, remaining too long without food, or otherwise diminishing his chances of recovery; the medical man likewise regulates the amount of exercise and so-called 'pulmonary gymnastics' (such as deep inspirations) which the patient may take, and the amount of stimulation by hydrotherapeutic processes. By residence in an institution of this kind the patient acquires hygienic knowledge and habits ('disciplinary treatment' or 'educational treatment') which must be very useful subsequently for himself, and possibly also for his family and others he comes in contact with.

In France a sanatorium for consumptives, instituted by Dr. Ch. Sabourin on similar principles to the foregoing ones, has existed since 1890 at Vernet-les-Bains on the Canigou Mountain, but it has not been regularly kept open throughout the year. We hear from Dr. S. Bernheim[1] of Paris and the 'Société des Sanatoria de France' that the erection of fresh sanatoria in various

[1] *Les Sanatoria pour Tuberculeux en France.* Communication by Dr. S. Bernheim at the International Congress for Climatology held at Clermont-Ferrand, 1896.

parts of France is being contemplated. Two new French ones have already been inaugurated, the Trespoey Sanatorium, near Pau in the Pyrenees, and the Durtol Sanatorium, near Clermont-Ferrand in the Auvergne.

According to Dr. S. Unterberger[1] private sanatoria for consumptives exist in Russia, namely at Halila in Finland, and Lindheim in Livonia. There is also one at Tonsaasen between Bergen and Christiania in Norway.

In England small private sanatoriums for the 'open air' treatment of consumptives have been instituted by Dr. Pott and Dr. Johns at Bournemouth, and Dr. Burton-Fanning[2] has carried out the same principles at a locality near Cromer, about a quarter of a mile from the sea and 250 feet above sea-level. As Dr. H. Weber has long maintained, there are many other places in England where sanatoria for consumptives might be erected (for instance, on the slopes of the sand hills to the south of London), and Dr. A. Ransome, Dr. R. Walters and others have advocated the introduction of a regular sanatorium system of treating consumptives in England. The educational influence of such measures amongst the public in general would likewise undoubtedly have a most potent effect, not only in the successful treatment of consumptives, but in the prevention of consumption.

The disease can, however, only be efficiently combated when means have been provided for dealing with its poorer victims. In this respect England has led the way by the early establishment in London of special hospitals for the poorer class of patients, and by the erection of the well-known 'Royal National Hospital' (1869) at Ventnor in the Isle of Wight, and the 'National Sanatorium for Consumption,' instituted in 1855 at Bournemouth. This example has been followed abroad; a sanatorium for poor consumptives was established in 1892 at Falkenstein close to the celebrated

[1] *St. Petersburg Med. Wochenschr.*, 1896, No. 32.

[2] See 'The Open Air Treatment of Phthisis in England,' by F. W. Burton-Fanning, in the *Lancet*, March, 1898.

private sanatorium, and now sanatoria for poor consumptives exist at Ruppertshain in the Taunus (opened in 1895), at Rehburg (for the town of Bremen) and St. Andreasberg in Hanover (Harz Mountains), at Goerbersdorf, and at other places in Germany; likewise at Davos in Switzerland, at Heiligenschwendi near the lake of Thun, &c. In fact largely owing to the constant exertions of Pfarrer W. Bion of Zürich and his friends, nearly every Canton of Switzerland will soon have its special sanatorium for the treatment of its consumptives. Others are being erected at various localities, amongst which we may specially mention that of Alland near Baden in Austria, which owes its foundation to the enthusiastic efforts of Professor von Schroetter of Vienna. In Hungary Koranyi, Kuthy, and others are endeavouring to bring about the establishment of similar public sanatoria. Norway possesses a sanatorium of this nature, near Molde, and we hear from Dr. Klaus Hanssen of Bergen, that in place of the old St. Jorgens Hospital for lepers (one day's journey from Bergen), a new sanatorium is being erected for the treatment of the consumptive poor.

In spite of considerable progress in the right direction the number of special institutions for the consumptive poor is still altogether inadequate to provide for the immense number of those afflicted with the disease. More sanatoria are undoubtedly needed, both institutions for the treatment of incipient and hopeful cases, and infirmaries for very advanced and very unfavourable cases, where patients who have no private means can be maintained, if necessary for the rest of their lives, so that at least they may be prevented from infecting others, and may be spared the terrible discomforts which necessarily attend on infirmity in squalid and crowded homes.

Sanatoria for scrofulous children

In this connection also the charitable sanatoria for scrofulous and weakly children should be mentioned, which apparently had their origin in England. The

Royal Sea-Bathing Infirmary at Margate was established as early as 1791, and now a few similar charitable institutions exist on various parts of the coast. The French have their well-known sanatoria for scrofulous and weakly children at Berck-sur-Mer ('Assistance Publique de Paris'), and others at Banyuls-sur-Mer on the Mediterranean coast and at Saint-Trojan in the island of Oléron ('Œuvre des Hôpitaux Marins'), and at Saint-Pol-sur-Mer, Pen-Bron, Arcachon, and Hyères. In Germany there are similar establishments on the coast, at Norderney, Wyk, Gross-Müritz, Zoppot, &c., as well as at some of the inland muriated spas such as Kreuznach, Kissingen, &c. Belgium likewise possesses sea-side sanatoria; and in Norway there are institutions for children at Fredriksvaern, near Laurvik, and at Hagevik, near Bergen.

CHAPTER XX

DIFFERENT DISEASES AND MORBID CONDITIONS WITH RESPECT TO THE SELECTION OF MINERAL WATERS, CLIMATES, EXERCISES, ETC.

In discussing the treatment of diseases or morbid conditions by spas, or by courses of the internal and external use of mineral waters, the physician and the patient must above all things drop the superstitious belief that the balneo-therapeutic treatment is something entirely different from the ordinary methods of treatment. The same considerations which guide the physician in the ordinary management of his patient, in the deviations from the natural healthy conditions of life, must guide him in the use of mineral waters; but the means which he uses in prescribing spa treatment are much more complicated than those of the ordinary home treatment. They require an intimate knowledge of all the elements which come into play when he resorts to spa treatment, and of the influences which they are likely to exercise on his patient. He has to regard not only the mineral waters which we can compare with the pharmaceutical elements, and which in themselves are often very complicated, but also the removal from home, the journey to and the climate at the spa, the altered diet and accommodation and other hygienic elements, and, above all, the qualities of the physician who is to guide the patient. Besides, we must bear in mind that the influences of these agencies are in many cases aided, in some also counteracted, by the subtle influence of the mind. This influence is very powerful, especially

in persons who are said to have 'nerves,' but it is by no means always calculable, and thus creates an element of uncertainty which does not exist to the same degree in prescribing pharmaceutical remedies or change of air at home.

Very often it happens that the diseased condition of the patient is complicated, and that the physician who advises spa treatment has to consider carefully which part of the diseased organism he is to act upon. He must form an idea of the nature and power of the constitution, and calculate in how far the different organs and systems can assist his attempt to restore the healthy working of the diseased organ or organs. We will endeavour to show this by an instance which is by no means rare, and occurs in numerous variations with more or less grave complications.

We will suppose that a person past the middle age suffers from frequent catarrhal affections of the bronchial tubes at the lower parts of the lungs, with imperfect contractions of the (probably dilated) heart; in consequence there is passive congestion of the liver, and possibly already of the kidneys, with a loaded urine, containing large amounts of urates and often small quantities of albumen. In such cases the physician must consider whether the patient's abdominal system will allow him the use of purging waters in order to relieve the portal system and the liver, and, through this, ease the action of the heart, and, by the more regular and powerful pumping action of the latter, the lungs; or whether, owing to the condition of the patient, he can only make very gentle demands on the bowels, and has to direct his action to the skin, and through this on the heart; in the latter case he may proceed by the use of warm baths, simple or saline or gaseous saline, in combination with, or without, carefully arranged exercises, or he may try restricted diet with digitalis or mercury, or both combined, or other pharmaceutical agents.

Often it occurs that the invalid has an affection which cannot be treated directly, it may be of the heart, of the kidneys, of the spleen, of the skin, or of the nerves, and that the medical adviser must recommend spas or climates by which the general health is improved, and the diseased part of the organism is indirectly drawn into the general improvement.

On advising about spa treatment the physician must consider, as far as it lies in his power, all the influences which are likely to act on the patient on the way to the spa, during his stay at the latter, and during the first weeks or months afterwards. In the preceding portions of the book special chapters are devoted to the discussion of these influences, and also to the importance of the qualities and duties of the local physician, on whom, to a great degree, the success of the spa treatment depends, and to whose guidance, therefore, the invalid ought in all cases to entrust himself.

Although it has already been mentioned that the patient should not make the sometimes necessarily long journey to the health resort without rests, we consider it necessary to repeat once more that every precaution ought to be taken to render the travelling as little fatiguing as possible, so that the patient shall not arrive in an exhausted condition. For this purpose the route and the places where the journey is to be broken must be carefully planned beforehand, as well as the time of the day for travelling; railway journeys in the hottest time of the day are often very injurious to delicate people.

With the description of the principal spas their suitability in the treatment of various affections has already been more or less fully given; we will restrict ourselves, therefore, in this chapter, to summarising what spas and climates and associated methods of treatment are applicable to the cure of different diseases.

The grouping of morbid affections cannot be quite

strict, because different systems and organs are often affected in the same person, and general affections are mostly combined with local deviations; in spa treatment, as in other modes of treatment, it is, of course, the patient that has to be considered, his constitution, habits of living, and even his idiosyncrasies, not merely the disease, local or general, from which he is suffering; it is convenient, however, to make diseases the basis for indicating the main lines of treatment at health resorts in different groups of cases, and we will commence with certain general or constitutional affections, and afterwards proceed to those of different systems and organs. For the description of the mineral waters and spas which we suggest, we refer to the former part of the book.

Tardy convalescence

1. *Tardy convalescence* from acute diseases is an important subject, and requires most careful management. There is a certain degree of exhaustion of vitality; the blood and all the tissues are, so to say, watery, and the proportion of solid constituents is diminished. All the functions are without energy. The circulation is weak, the heart is irritable; a slight exertion may raise the pulse from 60 or 70 to 140 and more in the minute. The skin is often damp, and a slight wind or change of temperature may cause a chill and serious general disturbance. In many cases of this class spa treatment is less useful than other slightly stimulating influences, such as sea air in some, and forest or mountain air in other cases. Fairly sheltered localities of medium elevation are in summer generally preferable to those of high elevation; many such places are mentioned in Chapter XVIII. amongst the second group. In spring and autumn the sunny places of the third group (Chapter XVIII.) are preferable, and in winter the warmer seaside localities mentioned in Chapter XVII. It is often necessary in these conditions to assist the removal of the products of retrogressive metabolism, and we must consider whether this ought to be done by ordinary pharmaceutical remedies or by spas. In

the latter case, generally the indifferent thermal spas (Chapter VI.) are useful, or the thermal 'Soolbäder,' such as Nauheim and Oeynhausen. For internal use the muriated waters (Chapter VII.) are preferable to the sulphated or alkaline waters. It frequently happens that the anæmia resulting from the acute disease requires chalybeate remedies, either pharmaceutical or in the form of mineral waters. Under all circumstances fatigue, great heat and great cold, and the exposure to violent winds must be avoided. At the same time the diet ought to be carefully superintended. A moderate amount of amusement acts as good tonic.

General debility

2. *General debility* is a term which may not be scientific, but the condition is real and demands sympathy and help. The symptoms are in many persons similar to those of tardy convalescence, although no acute or chronic disease of any special organ has preceded it. The nervous system and the whole body are often in a condition to which the term 'irritable weakness' has been applied. A severe nerve shock or chronic mental worry belongs in many cases to the causes of general debility. Under the influence of mental depression the breathing and consequently aëration of the blood are diminished; the inclination to take exercise and food is wanting; sleep is disturbed and the nutrition of all the organs and tissues becomes impaired. The treatment, as well by spas as by climate, is rather similar to that of tardy convalescence, but more difficult, and the failures are numerous. Owing to the long persistence of the debility and the numerous useless trials which have been made, such patients generally have lost confidence in medical treatment, and are not easily manageable. The physician of the health resort must exercise judicious authority in insisting on the dietetic and hygienic arrangements which appear necessary to him. If he uses his influence well, he has a better chance of success than the medical men at home have had.

Anæmia

3. *Anæmia* is of very different import in different persons. The causes vary widely, and the condition of the organs and tissues, and of the nutrition of the body, requires careful consideration in advising the use of spas or climate or other treatment. For the sake of convenience we may divide the anæmias and anæmic invalids into different classes. (**a**) Those who suffer from anæmia caused by direct loss of blood or of the component parts of blood (for instance, when the anæmia is due to hæmorrhage from operations, traumatic injuries, or to purulent, muco-purulent, or serous discharges) are mostly adapted to treatment by iron, and we have to consider whether it is best to use pharmaceutical remedies or chalybeate spas (Chapter XII.), whether pure or compound chalybeate waters are best suited, and whether the spa should be one of high, medium, or slight elevation above sea-level. (**b**) In forms of anæmia caused, not by direct loss of blood, but by acute or chronic disease, neuralgia, different kinds of worry, or sleeplessness and inability to take food, the mildest thermal treatment, combined with forest or mountain climates of moderate elevation (Chapter XVIII., Group II.), or the latter alone, is often all that can be advised, if the person is of delicate constitution; while in others who are less feeble, according to individual conditions, common salt waters, with or without iron, or the gaseous tepid salt baths of Nauheim and Oeynhausen, or the stronger influences of sea air and sea baths (Chapter XVII.), are useful. In the stronger class of patients prolonged residence at high elevations (Chapter XVIII., Group I.) during summer is often beneficial, though localities of medium elevation (Chapter XVIII., Group II.) are more frequently found useful; whilst in winter warm and sunny seaside places (Chapter XVII.) are to be recommended. (**c**) If, as often is the case, anæmia is the result of sluggish portal circulation, constipation, hæmorrhoids, or congestion of the pelvic organs, one of the common salt waters with a

certain amount of iron, such as Kissingen and Homburg, or one of the cold sulphated alkaline waters, like Franzensbad and Elster, must generally precede the use of pure iron or iron and arsenic waters (Chapter XIII.). In most cases of anæmia, especially in the classes (*b*) and (*c*), the careful selection and preparation of food and the social elements are so important that the physician in recommending a locality is not to be guided by waters and climates alone, but must take the elements just mentioned into special consideration. (**d**) The anæmic conditions produced by long residence in hot climates, often complicated with malarious affections, with enlargement of the spleen and liver, require treatment similar to that of class (*c*); but in these cases it is especially important to select localities which are entirely free from malaria, and where the temperature is moderately cool. Tarasp and St. Moritz in the Engadine offer great advantages. A long stay at high elevations ought always to follow the spa treatment in this class of cases, if possible at places in the immediate neighbourhood of great glaciers, such as Pontresina, the Eggischhorn, the Bel-Alp and Montanvert above Chamonix. (See Chapter XVIII., Group I., and Chapter XXI.) The spending of several hours every day on the glacier is especially useful. For syphilitic anæmia see Section 5.

Chlorosis we may regard as a variety of anæmia connected with the development of the sexual organs and functions, and occasionally also with small size of arteries, occurring in females. In many cases, in addition to hygienic and dietetic management, rational home treatment is sufficient. There are, however, persons who do not bear the ordinary pharmaceutical iron remedies, and who are much more benefited by pure chalybeate mineral waters. Other chlorotic patients are not at all benefited by iron alone, while they improve rapidly at muriated spas[1] with or without

Chlorosis

[1] A. Robin, of Paris, and H. Keller, of Rheinfelden, from experiments on the metabolism, come to the following conclusion, amongst others—

iron, or at the alkaline sulphated spas of Franzensbad, Marienbad, and Tarasp. This is especially the case when sluggish portal circulation is a complication. Other cases are benefited by muriated alkaline waters containing iron or arsenic, such as Royat and Saint Nectaire. Arsenical waters are often beneficial when iron waters fail to be so. In chlorotic patients it is especially important to avoid fatigue. The amount of exercise which they take at spas must be carefully supervised. Under the false impression that any amount of exercise in the pure open air must be good for them, or because they wish to do the same as stronger companions, such patients not infrequently lose as much by over-fatigue as they gain by good air and the mineral water, or they even become worse whilst undergoing treatment at spas or climatic health resorts.

Strumous and tuberculous affections

4. *Strumous*[1] *and tuberculous affections.*—In former years Kreuznach, Ems, Soden, Reichenhall, and other localities were frequently recommended; but we now regard spa treatment as of secondary importance. During summer the sea coasts of England are infinitely more useful to scrofulous children than hot inland spas, such as Kreuznach and Ems; and the education of scrofulous children entirely at the seaside is one of the most successful means of managing such cases. What were formerly called strumous affections of the joints

that brine baths (6 per cent. or more) are suitable in those forms of chlorosis where the nitrogenous metabolism requires stimulation.

[1] Amongst 'strumous affections' we include those affections of the lymph glands, skin, &c., which were usually termed 'strumous or scrofulous' before Koch's discovery of the tubercle bacillus; the course of these affections separates them clinically from tuberculosis occurring in the lungs. and enlarged scrofulous glands do not always contain tubercle bacilli. Needless to say, we admit the probability of a 'strumous,' 'lymphatic,' or 'tuberculous' diathesis as usually existing (whether congenital or acquired) prior to the invasion of the tissues by the tubercle bacilli. In other words, there must be in the body generally, or in certain organs or portions of the body, a want of effective reaction against the bacilli. Unfortunately, this predisposed condition often cannot be, or is not, detected before the microbes have gained an actual footing.

and bones have, since Koch's discovery of the tubercle bacillus, been admitted to be, at least in most cases, of tuberculous origin, and it has been found that they are in most instances amenable to aseptic surgical treatment.[1] These good results of operation are apparently more readily obtained in suitable climates—for instance, at the hospital of Samaden in the Upper Engadine under the direction of Dr. Bernhardt, and at the Royal Sea Bathing Infirmary of Margate. There are now facilities for the education of children at many health resorts, even at high altitudes (Davos and St. Moritz).

In some forms of chronic enlargement of the lymphatic glands of the neck, whether actually tuberculous or not, with or without enlargement of the tonsils, the use of muriated springs internally and in the form of baths, or of the gaseous thermal 'Soolbäder,' may be resorted to with advantage, if residence at the seaside or pharmaceutical treatment has not been successful. In many of these cases, however, surgical treatment ought not to be deferred too long.

Pulmonary tuberculosis is now generally admitted to do best under dietetic and hygienic management (see note on the Sanatorium Treatment of Phthisis in Chapter XIX.) in what may be termed aseptic climates, in elevated regions, the desert, or on the high seas. Occasionally, however, arsenic spas may be of temporary assistance, such as Mont Dore and La Bourboule. The sulphur waters of the Pyrenees have an old-established reputation, and it is a matter of general experience that the catarrhal conditions associated with phthisis (especially in quiescent cases) are often alleviated at Eaux-Bonnes, Cauterets, Le Vernet, Amélie-les-Bains, Luchon, and Bagnères-de-Bigorre. In quiescent and cured cases Gleichenberg, La Bourboule, and other muriated-alkaline and muriated waters may prove useful for associated dyspeptic troubles, &c. A locality which has obtained a great reputation, and which is often very useful in cases of chronic phthisis with frequent catarrhal complications, is Weissenburg in the canton of Bern. The sheltered position of this spa in

[1] *Tuberculous Disease of Bones and Joints.* By W. Watson Cheyne. Edinburgh and London, 1895.

the midst of a pine forest has doubtless a great share in its beneficial influence.

If cases where the larynx is affected be sent to spas or health resorts, care must be taken to select those places only where there are medical men capable of carrying out any local treatment that may be necessary.

Hydrotherapeutic measures were employed by Brehmer when he introduced the open air treatment of pulmonary tuberculosis at Goerbersdorf. He made use chiefly of cold douches, which, when employed judiciously, aid the open air treatment in strengthening the skin. They also, like the so-called 'respiratory gymnastics' of various kinds, encourage deep inspirations. Respiratory exercises in phthisical patients, however, beneficial though they are, require great caution, whatever method be employed.

Often comparatively mild hydrotherapeutic applications are to be preferred, and serve equally well for keeping the skin in good condition. The care of the skin, says Hess (*Practitioner*, November 1897), is of great importance, especially in anæmic patients and those who perspire much. At Falkenstein, in addition to regular lukewarm baths for cleansing purposes—taken by the strong in the bath-rooms, and by those who are seriously ill or feverish in a transportable bath at the bedside—the bath-room attendants rub the patients down in bed every morning: the weaker, and those who perspire much at night, with a dry flesh towel; the stronger, with spirit and water, or water only. Strong, well-nourished, and not anæmic patients, with slight apparent lung trouble, take a short sharp douche of ten to thirty seconds' duration, followed by a thorough good rubbing down and a short walk. Winternitz ('Zur Pathologie und Hydrotherapie der Lungenphthise,' 1887) sponges his feverish patients in the following order: hands, forearms, arms, face, neck, axillary cavity, back, abdomen, and lastly lower extremities.

To prevent the progress of bronchial catarrh in

phthisical patients C. Schütze [1] and C. Clar [2] recommend the 'Kreuzbinde' of Winternitz [3]—that is, a crossed thoracic compress wrung out from cold water. The ordinary Priessnitz bandage has likewise been recommended for the upper part of the thorax in pulmonary tuberculosis. In order to produce a condition of artificial hyperæmia in the affected pulmonary apices, the reclining at full length, with the pelvis and lower limbs raised, has been recommended, but for the same purpose likewise a thermal plan of treatment has been advocated by E. Jacoby.[4] The latter consists in the application for a quarter to half an hour twice a day of a kind of local hot water bath to the upper part of the thorax; it is as yet too early to speak of the real utility of this method. Hydrotherapeutic procedures of various kinds have been recommended for many of the complications and troublesome symptoms in phthisis, but we cannot discuss these here.

Long residence at high elevations (see Chapter XVIII., Group I.), in winter as well as in summer, is of great prophylactic and curative value in pulmonary tuberculosis, and young persons may with advantage be altogether educated at Alpine health resorts.

If a great portion of the lung substance has been destroyed, the localities of medium, and occasionally of low, elevation (Chapter XVIII., Groups II. and III.) are better than those of high elevation. In erethic subjects and those with irritable cough, the more equable and milder marine climates (Chapter XVII.), and other relatively moist, warm, and sunny climates, are mostly preferable. When there is much emphysema, bronchitis, or cardiac disease, warm and usually dry climates are

[1] 'Die Hydrotherapie der Lungenschwindsucht.' *Arch. der Balneotherapie und Hydrotherapie.* Halle-a.-S., 1898, p. 23.

[2] *Blätter für klinische Hydrotherapie.* Vienna, 1892.

[3] 'Hydrotherapeutics' in Von Ziemssen's *Handbook of General Therapeutics.* English translation, vol. v., 1886, p. 525.

[4] 'Thermo-Therapie der Lungentuberculose,' *Verhandlungen des XIV. Congresses für innere Medicin.* Wiesbaden, 1896, p. 576.

required, and this is still more the case when there is albuminuria. Advanced cases with hectic fever, and cases with much laryngeal [1] or intestinal ulceration or any chronic diarrhœa, are best kept at home, and we need scarcely add that very acute cases should not travel during the acute stage.

Rickets

In *rachitic children* the diet is of main importance. With regard to climate they should be brought up much as scrofulous children ought to be, in pure air—sunny, sheltered, warm seaside localities being especially suitable. Cold and damp must be avoided. Warm brine baths and hydrotherapeutic measures according to individual reactive powers are useful. Amongst the mineral waters which have been recommended for drinking, the alkaline-earthy chalybeates might be employed in some cases.

Syphilis

5. *Syphilis* is only to a very limited degree amenable to balneo-therapeutic treatment; ordinary methods of treatment are required. The idea that hot sulphur or other thermal waters can cure it is without foundation. Hot baths, however, can, as nearly all admit, assist the ordinary medical treatment, especially the mercurial treatment,[2] and energetic courses of inunction can be much better arranged abroad, away from home work and home surroundings. Thus gradually a speciality in the management of such courses of treatment has been

[1] Though pharyngeal and laryngeal irritability is increased in the dry atmosphere of high altitudes, as it is in other dry climates, even in the absence of dust, Derscheid (*Tuberculose Laryngée et Altitude*, 1897) has recently shown from a statistical examination of Dr. L. Spengler's practice at Davos that laryngeal tuberculosis in itself does not constitute a contra-indication to treatment in high altitudes any more than does hæmoptysis, which was at one time wrongly supposed to be a contra-indication. The question really depends on the general condition of the patient, and on other indications, as well as on the possibility of getting efficient local treatment, if required, at the health resort in question.

[2] Though, as A. Neisser (*Berliner klin. Wochenschr.*, 1897, Nos. 16, 17) points out, during inunction treatment baths wash away some of the mercury which would otherwise be absorbed, and sulphurous baths convert some of the mercury into the inactive sulphide.

developed at some places, as at Aix-la-Chapelle, Uriage, Luchon, &c., and the results are mostly satisfactory.

The favourable influence of spa treatment in association with specific treatment depends on various causes. As already mentioned, the absence from home work and home surroundings is often advantageous. The baths (thermal sulphurous, muriated sulphurous) keep the skin in good condition during the treatment, and probably favour the excretion by the kidneys of the specific toxins of the disease. They doubtless increase the elimination of the mercury, but by preventing its deposition in the tissues in a comparatively or temporarily inert form, may increase its specific power whilst it remains in the body. When taken internally, Neisser (Balneolog. Congress, Berlin, 1897) suggests that sulphurous waters may help to ward off mercurial enteritis, and that common salt waters may be of use by their action (in sufficient doses) of favouring metabolic processes generally, and so also those undergone by the mercury in its passage through the body.

In some persons the constitution becomes entirely undermined by the poison of the disease. Gradually, with or without local affections of the brain and other organs, a cachexia is developed, which is not cured, but may at times be even increased by the usual anti-syphilitic remedies. In such conditions, with widely varying symptoms, the influence of forest and mountain air is often beneficial; but this must be continued during many weeks and months, and may be assisted by the use of simple thermal waters or thermal sulphur waters, especially those at high or fairly high elevations; for instance, Barèges, Cauterets, Bagnères-de-Luchon, and Wildbad-Gastein. Now and then iron or arsenic waters find their application in such cases, and here, again, those at high elevations deserve the preference, such as Mont-Dore, La Bourboule, and(when the new plans have been carried out) Levico. Judicious hydrotherapeutic treatment is likewise occasionally of great use. The winters

ought to be spent in mild, dry, and sunny climates, by which the diminished powers of the constitution are not overtaxed.

Chronic metallic poisoning

6. Balneo-therapeutic treatment is occasionally resorted to in cases of *chronic metallic poisoning*, especially from *mercury* and *lead*; but the benefit to be derived from it is limited. The most rational treatment is to endeavour to introduce into the blood and tissues substances which form soluble solutions with the poisons deposited in them, and thus assist in their gradual elimination. We scarcely think that mineral waters fulfil this demand. Something may be done by increasing the secretions and excretions, and by thus promoting the removal of the poisons from the body. This object can to some degree be obtained by the internal and external use of indifferent thermal and weak sulphur waters (see Chapters VI. and XIV.). The further consideration that these poisons are predominantly deposited in the liver leads to the use of the sulphated alkaline and muriated sulphated waters, especially the thermal ones, such as those of Karlsbad and Brides-les-Bains, by which the secretion of bile is promoted.

Lead paralysis demands, in addition to the ordinary use of the thermal waters, that of douches, massage, and electricity.

Malarial cachexia

7. *Malarial affections* are common amongst those who reside, or have resided, in malarious districts, especially in hot climates. Balneo-therapeutic treatment is only of secondary importance. Pharmaceutical remedies, combined with long residence at high elevations free from malarial air, and especially near glaciers, produce in the majority of persons the most satisfactory results. (See Chapter XVIII., Group I.)

Occasionally we meet with rebellious cases, complicated, for instance, with catarrh of the bowels, generally with pale motions, in which gentle courses of the thermal muriated-sulphated or sulphated-alkaline waters, such as those of Brides-les-Bains and Karlsbad, are

useful; or, in the case of very delicate persons, the simple thermal waters of Plombières. When there is considerable enlargement of the spleen and liver we must not expect complete reduction of these organs, but we have seen fairly good effects from the sulphated-alkaline waters, especially in an elevated locality, like Tarasp. A long stay at high alpine localities ought always to follow the course of waters. (See Chapter XVIII., Group I., and Chapter XXI.)

When there is no special complication in the abdominal viscera, but only malarial cachexia with anæmia, the waters and climate of St. Moritz or of Ceresole Reale can be recommended. When there are frequent attacks of neuralgia or rheumatism, the simple thermal waters in alpine valleys, such as at Wildbad-Gastein, and the arsenical waters in higher localities, especially at La Bourboule and Mont Dore, deserve a trial, or those of Val Sinestra, which may be employed at Tarasp.

Diabetes. Glycosuria

8. *Diabetes mellitus; glycosuria.*—We cannot enter on the pathology of glycosuria, but refer to the works of Frerichs, Seegen, Pavy, W. H. Dickinson, and one of the last authors on the subject, C. von Noorden. In former years mineral waters were considered pre-eminently curative, and particularly the thermal alkaline, muriated alkaline, and alkaline sulphated waters, amongst which, again, those of Vichy, Neuenahr, and Karlsbad enjoyed the greatest reputation. Their application, however, is limited. No complete and permanent cure of established diabetes is known to us from spa treatment; but fair results, such as great temporary improvement, which were regarded as cures, have often been obtained, and are frequently obtained now. These results, however, if we examine them without prejudice, are only partially due to the mineral waters. The management of diet, attention to muscular exercise, and regimen in general, have the greater share, and the patient much more readily submits to such management at a spa, away from home. The whole hygienic arrangement greatly assists the diet,

and the mental rest and climatic influences are of great importance. For practical purposes we may divide diabetics into three classes, though there is no strict line of definition between them.

(*a*) In the grave and often acute forms in young persons, with excessive loss of sugar, great quantities of urine of high specific gravity, burning thirst, rapid emaciation, and great loss of power, mineral waters exercise scarcely any useful influence, and the fatigue of the journey to a spa is often deleterious, while dietetic and pharmaceutical treatment at home, or in the neighbourhood of home, especially at a sheltered place of fair elevation, can often do much to check the progress of the disease. It is to the cases of this class that the term diabetes is confined by some authorities, such as Dr. Lauder Brunton ('Clinical Lecture on Diabetes,' *St. Barth. Hosp. Journ.* Feb. 1896, p. 67), the well-nourished and fat cases being classed as gouty or fatty glycosuria. If the term 'diabetes' be accepted in this sense, then one must say that only cases of 'glycosuria'[1] are suited to spa treatment. It is because cases of 'chronic glycosuria' or 'benign diabetes' may transform themselves into cases of 'grave diabetes,' that Dr. Pye-Smith (Clinical Lecture, *Guy's Hospital Gaz.* March 14, 1896, p. 126) and others prefer to retain the term 'diabetes' for the benign cases as well as for the grave ones.

(*b*) In the chronic forms, without (at least as yet without) much change of the body weight, either by increase or loss, and without the prominent symptoms of acute diabetes, the proper regulation, without too severe restriction, of diet, and the arrangement of exercise and of the whole manner of living, assisted

[1] By those who use the term 'diabetes' in its more *extended* sense the term 'glycosuria,' when employed in contradistinction to 'diabetes,' would be applied to such cases only in which the presence of sugar in the urine is due to temporary causes, occurs in small amounts (under one per cent.), and soon passes off under judicious management without special treatment.

occasionally by pharmaceutical treatment, will do as much good as mineral waters. We all know that mental shocks and worry have a great share in the production of this form—in fact, of all forms—of diabetes, and that every kind of worry and anxiety must be avoided as much as is possible. Hence frequent changes of climate and locality exercise a beneficial effect in this class of cases, even without any other treatment, spa treatment included, provided the necessary diet can be obtained. The bracing effect of long residence in elevated alpine and forest regions during summer is especially useful, while during winter milder and more sunny localities are to be selected. If the general strength is, as it often is, diminished, the changes must be of long duration, and to milder climates, or to places where the demands on the organism are moderate. Owing to the great influence exercised by the psychical nervous system in diabetes, agreeable mental occupation is to be combined with the change if possible: hence a visit to Egypt, with a tour on the Nile, or to Sicily or Magna Græcia, or yachting in the Mediterranean, or a stay at Rome or the Riviera, is often attended by great benefit. The maintenance of a proper diet is, however, sometimes a source of difficulty when travelling, and the change should only be to localities where suitable food in sufficient quantity and variety can be obtained.

In many cases a course of waters during the summer months forms a useful mode of change. In weakly persons the simple thermal baths at spas of moderate elevation, such as Gastein, Buxton, Wildbad, Schlangenbad, and Ragatz, assisted by the internal use of very moderate quantities of muriated alkaline waters, act beneficially; in other cases the internal use of alkaline or muriated alkaline waters alone may be recommended (Vichy, Neuenahr, Obersalzbrunn, Royat, or La Bourboule). It must be understood that a suitable, but not too restricted, diet is essential, and ought to become a habit with diabetic persons. Some cases of this class,

as of the next, are intimately connected with a gouty tendency, and this must be taken into consideration in the treatment. Slight albuminuria due to chronic interstitial changes in the kidneys may be present in the older subjects of this class.

(*c*) In a third class of glycosuria, we find the tendency to accumulation of fat, combined with the presence of sugar in the urine, sometimes in small, at other times in large, quantities. Occasionally in this class of cases attacks of uric acid gravel alternate with attacks of glycosuria, and sometimes sugar and uric acid sediment may occur at the same time. Albuminuria sometimes appears in this class of cases, first at intervals, afterwards regularly, but mostly the albumen is present only in small quantities. The glycosuria of fat persons is usually allied with abdominal venosity, and the muscles of the heart are generally weak. It occurs not rarely in gouty persons or persons belonging to gouty families. In this class mineral waters are frequently useful, especially the sulphated alkaline (Chapter X.), and also the pure alkaline (Chapter VIII.), and the thermal more so than the cold springs. Karlsbad, Brides-les-Bains, Vichy, and Neuenahr owe their reputation in diabetes principally to this class of cases. Contrexéville, too, may be recommended with advantage, especially in those persons who have attacks of gravel alternating with glycosuria. Harrogate and Llandrindod may likewise be occasionally advised, as the small amount of sulphur forms no contra-indication. Long residence at mountain health resorts (Chapter XVIII., Groups I. and II.) has a most beneficial effect in many cases. In this class of glycosuria massage and Swedish gymnastics may be combined with the spa or climatic treatment when the patients are too fat or disinclined to take sufficient ordinary exercise.

In order to ascertain the most suitable kind of diet for individual cases of diabetes, and at different stages of the same case, there is much to be said in favour of temporary residence in some establishment, either at a

health resort or not, where the urine can be regularly examined and the effect on the metabolism of different test diets be properly determined.

Diabetes insipidus may be considered a polyuria of nervous origin, and will be mentioned under the head of disorders of the nervous system.

Urinary gravel

9. *Gravel* is often considered as a disease of the urinary organs, but this is not more correct than to say that diabetes is. It is caused by a disorder in the assimilation of food and in the metabolism of the tissues. There are different kinds of gravel, viz. (1) uric acid and uric acid salts; (2) oxalate of lime; and (3) phosphatic gravel (phosphate of lime and triple phosphates). We may almost restrict ourselves to the first kind, uric acid gravel. Although it occurs from heredity, frequently associated with gout or rheumatism (the arthritic diathesis), or sometimes from drinking calcareous water, or from unknown causes, we mostly find it in persons who eat largely or take much alcoholic stimulants, and do not take enough active exercise. The arrangement of diet and regimen is therefore essential.

In those who are inclined to stoutness and redness of face the sulphated and sulphated alkaline waters (Chapters XI. and X.); in many persons, especially if they are pale and inclined to diarrhœa, the pure alkaline waters (Chapter VIII.) are useful; in lean persons the muriated (Chapter VII.) or simple thermal [1] (Chapter VI.) waters are preferable. Many French physicians prefer the earthy waters of Contrexéville.

As a dietetic beverage the waters of Luhatschowitz (a tumblerful night and morning, either cold or hot) can be recommended with a fair chance of success. In some persons a smaller quantity is sufficient, in others a larger quantity is required. The regular examination of the urine must decide this question. In Portugal, the waters of Vidago have a special reputation, and are

[1] The alkaline silicates (often about 0·1 per mille) in simple thermal waters have according to Felix a distinct solvent action on uric acid.

regarded as almost infallible in expelling and preventing renal calculi. In many persons potions of hot water night and morning, or the use of simple distilled water (non-gaseous Salutaris water), or of the nearly pure waters of Malvern and Evian, or of the gaseous so-called table-waters of Apollinaris, Roisdorf, Selters, &c. (Chapter XVI.), combined with a well-arranged manner of living, are sufficient to prevent recurrence of uric acid gravel.

Oxaluria

In persistent *oxaluria* with dyspepsia, the digestion and general metabolism, which are at fault, may often be better rectified by spa treatment (Section 18) in conjunction with arrangement of exercise and diet, than by ordinary drug treatment. Amongst mineral waters the alkaline earthy group (Contrexéville, Wildungen, &c.) are useful, and often to be preferred to the stronger simple alkaline waters of Vichy, &c. When the nervous system is principally at fault—from overwork or excitement—a stay at some quiet health resort is likely to be of use, without special treatment, or combined with the mild diuretic effect of some simple thermal spring.

Phosphaturia

Phosphaturia is often a cause of great anxiety to students and men of sedentary habits. Spa treatment is rarely required: an increased amount of open air exercise is frequently sufficient to remove the trouble. Exercise acts partly perhaps by improving the circulation in the stomach, and thus facilitating the return of the hydrochloric acid required during the process of digestion into the blood, and so diminishing the alkalinity of the blood and the urine. We have often seen that a course of active exercise, such as regular fencing, riding on horseback, golfing, and still more, a walking tour in the Alps or in other mountainous regions, rendered the urine which had been for many months thick from precipitation of phosphates (through insufficient amount of acid) perfectly clear (cf. Dr. Lauder Brunton's *Lectures on the Action of Medicines*, London, 1897, p. 540). Simple alkaline waters, which are occasionally prescribed, mostly aggravate phosphaturia, and their use produces nervous

depression in this complaint. Muriated waters, on the other hand, generally exercise a favourable influence, which we are inclined to attribute to their stimulating action on the mucous membrane and muscular coats of the stomach and duodenum.

Rheumatism

10. *Rheumatism* requires very different kinds of treatment in different persons and constitutions, and the term, as used at present, includes affections of different nature, which, with increasing knowledge, will become more and more defined from each other. It is scarcely necessary to say that we here occupy ourselves only with the chronic and almost chronic forms. The nearer a case lies to the acute or subacute forms and stages, the greater is the care required with regard to the balneo-therapeutic treatment.

Convalescence from acute articular rheumatism

This care is especially necessary with persons convalescent from acute articular rheumatism, or with a tendency to attacks of this disease. The whole system is over-susceptible, the skin is very weak, the circulation is very easily excited, the digestion is apt to be deranged, and a comparatively slight cause may set up a kind of relapse or a fresh attack. Of cases with a tendency to acute articular rheumatism, it may be said that the nearer a person is to a previous attack of the disease, and the younger the individual, the more easily a fresh attack may be caused by imprudent management. It is nearly certain that acute articular rheumatism is entirely different in nature from the affections ordinarily referred to as chronic muscular rheumatism and chronic articular rheumatism (rheumatoid arthritis, arthritis deformans), and the disease is placed here only for the sake of convenience and of the name.

Ordinary balneo-therapeutic procedures are not suitable during the first period of convalescence from acute articular rheumatism ;[1] but if the convalescence is very slow, if the heart remains weak and irritable with or

[1] Powell (*Lumleian Lectures*, 1898) draws special attention to the risk of causing yielding of the inflamed and softened cardiac valves by any premature exertion.

without valvular complication, and if travelling, with special care, is permissible, a very cautious course of bathing at the thermal gaseous 'Soolbaeder' of Nauheim or Oeynhausen is likely to be eminently beneficial.

If the general condition is good, the heart free, and the skin not very weak, but the joints remain more or less stiff and swollen, the simple thermal waters and the muriated waters (Chapters VI. and VII.) are applicable. Douches, massage, and Swedish gymnastics are helpful, but the management of these accessory means requires great cautiousness in the beginning.

The duration of the courses of bathing must often be five or six weeks, and sometimes more, and ought to be followed by a stay at a moderately elevated, sunny, and dry locality, such as Les Avants, Glion, St. Beatenberg, Gurnigel, Badenweiler, or at a fairly warm marine spa. In winter the Western Riviera provides the most favourable health resorts.

Chronic articular rheumatism

Chronic rheumatism of joints and the results left after acute articular rheumatism.—If attacks of rheumatism have left chronic swelling or stiffness of joints without special affection of the whole constitution, the balneotherapeutic means are numerous. More or less all the hotter simple thermal springs and the thermal sulphur spas can be rendered useful, and also the brine baths ('Soolbaeder') in England and abroad. Massage, douches, douche-massage, passive movements, Swedish gymnastics and graduated voluntary movements, graduated walking or cycling exercise—all with careful adaptation to the individual case—assist the treatment. In many instances local hot applications, like cataplasms of moor earth, peat, simple or sulphurous or salt mud, are used with advantage; and also local (or, in some cases, general) baths of the same substances or of hot sand. In winter sunny and dry localities are useful, such as those on the Western Riviera.

Muscular rheumatism,

Chronic muscular rheumatism.—The pathological anatomy of muscular rheumatism is by no means clear, and naturally so, since the affection is never fatal in

Chronic myositis, Lumbago, &c.

itself. Some cases are associated with osteo-arthritis and others with gout. In some cases the trouble may really be a referred pain, due to what may be termed 'eradiation,' and the cause of the pain may lie in some osteo-arthritic or other affection of a shoulder, hip or intervertebral joint. In other cases the pains complained of may be due to a partial neuritis of some nerve trunk or its branches. In still other cases, especially in certain forms of lumbago, the pains may have originated in the rupture of partially degenerate muscular fibres or of the interstitial tissues, resulting from some slight strain or violence, probably not sufficient to have injured perfectly healthy muscles. In chronic muscular rheumatism the use of hot general baths may be employed as in the preceding group, and can be more freely assisted by douches. In many instances internal courses are required to assist the treatment by baths, according to the nature of the complications, such as dyspepsia, constipation, or the uric acid diathesis. For after-treatment in this as well as in the previous group it is necessary to select dry and sunny localities, at moderate elevations if possible, on the southern or western slopes or terraces of mountains.

Some localised pains having their seat in the muscles, or partly in the muscles and fibrous tissues, partly in the nerves, sometimes associated with indurated tender spots, and termed 'chronic rheumatic myositis,' can be much benefited by massage, with or without accompanying thermal or climatic treatment. To this class some cases of lumbago may probably be assigned, and it is important to search for such indurated spots ('rheumatische Schwielen,' in German) in the muscles, fasciæ and subcutaneous fibrous tissues, when treating cases supposed to be ordinary 'muscular rheumatism,' 'sciatica,' or 'neuralgias.' H. Strauss[1] and others point out that, if these spots be detected, excellent results may often be obtained from their local treatment

[1] *Berliner klinische Wochenschrift*, 1898, Nos. 5 and 6.

by massage, hot baths and compresses, or local baths of peat, mud or 'fango.'

The great tendency to relapses in chronic rheumatism requires 'strengthening of the skin' by hydrotherapeutic procedures, by active exercise, and by being much in the open air, which, in so-called rheumatic persons, ought to become parts of their daily life and habits.

Sciatica and similar affections

11. *Sciatica, brachialgia,* and similar complaints are often of a gouty nature. There are also other causes of these affections. The severer forms are generally due to neuritis, and require at first rest; massage, the douche-massage, and forcible douches must be absolutely abstained from during the acute period. After the acute stage is over simple thermal, or thermal muriated, or thermal sulphur, or thermal muriated sulphur, or cold muriated waters heated, are useful, and the use of the hot bath is often advantageously combined with douches and massage. Hot douches, alternate ('Scotch') douches, or the douche massage constitute the chief part of the balneo-therapeutic treatment in many cases of sciatica, muscular rheumatism, &c., and such treatment can be obtained at Aix-les-Bains, Aachen, Uriage, Bourbonne, Harrogate, Bath, Sidmouth and many other localities. Such applications are usually made general, though specially directed to the affected parts of the body.

Rheumatoid arthritis

12. *Rheumatoid arthritis.*—For this affection, which differs from both gout and true rheumatism, we use the term first employed by Sir A. B. Garrod in 1858. Other terms in equally general use are: 'arthritis or polyarthritis deformans,' the term employed by Virchow; 'osteo-arthritis,' a favourite term amongst surgeons in England; chronic rheumatism of joints, chronic rheumatic arthritis, and rheumatic gout, all older terms but still much used.[1]

[1] In our description of individual spas we have sometimes alluded to this complaint under the popular terms still so much in use for this class of cases, viz. 'chronic rheumatism,' and 'chronic rheumatic affections.'

Injury seems to play a more prominent part in the causation of the monarticular forms of this affection, especially in older and feeble persons (*e.g.* senile hip joint disease) in whom the recuperative power of the tissues is lessened. In the more rapid and subacute forms of the affection, especially if accompanied by a certain amount of fever (in younger persons, but also occurring sometimes in older persons), there seem at least grounds for entertaining the view, as set forth by Max Schüller of Berlin, and Bannatyne and Wohlmann of Bath, that a microbic invasion may play some part in the causation of the malady. In other cases perhaps, as in some of the so-called 'pseudo-rheumatisms,' the joints may be affected, not by a local growth of microbes, but by injurious substances circulating in the blood, the result of the action of microbes in other parts of the body (chronic suppurations, catarrhs &c.). As to the influence of the nervous system in this disease there is still much doubt. It may be also noted that a chronic persistently monarticular arthritis (*e.g.* of one knee) in a middle-aged apparently well-nourished person turns out occasionally to be tuberculous and not rheumatoid arthritis with effusion, as was at first supposed.

The views held at the present time as to the pathology of chronic rheumatoid arthritis, admirably summed up by Professor Bäumler at the Berlin Medical Congress of 1897, have a considerable bearing on what is to be expected from its treatment. Cases are sent to a number of spas, but none exercises a really curative effect. The general condition is, however, frequently improved by very gentle treatment at the simple thermal, thermal sulphur, and thermal muriated spas, occasionally also by the muriated alkaline springs when the spas are situated in good climates, and especially when they are situated at moderate elevations. Mud or peat baths (general) are often employed. Local baths or applications of this kind may sometimes be preferred

in monarticular forms of the disease. Local hot vapour or hot air baths may likewise be serviceable when the affection is mainly limited to one joint, especially if there is much pain.

Change of locality forms an important element in the treatment of this complaint, especially change to dry and sunny climates without excessive heat or cold. Judicious changes of climate and a simple but nourishing arrangement of diet, with the moderate but systematic use of exercises of various kinds, pursued during many years, often give a satisfactory result, though not amounting to a cure.

Professor A. Ott at the Berlin Medical Congress of 1897 considered that all the various kinds of local and general baths employed in rheumatoid arthritis owed much of their efficiency to their heat. Hence, according to him, the hotter the bath, the more likely is the patient to derive benefit from the treatment, provided that his organs are in a condition to stand the heat, and that in a course of baths the highest temperatures be abstained from at the commencement, for fear of undue reaction. On this principle the reported good effects of the Tallerman-Sheffield local hot air baths can easily be explained.

'Senile hip-joint disease' (malum coxæ senile) is by the patients themselves usually called gout, sometimes rheumatism. It is generally by medical men classed as a localised variety of rheumatoid arthritis, like the less frequent similar affection of the shoulder-joint. In regard to balneo-therapeutics we refer to what we have just said, but it is not very amenable to treatment.

The 'multiple nodosity of joints' of the fingers is likewise rarely cured; and some invalids have made the round of many spas, on their own or their friends' advice, without being able to point to an improvement in the joints, though their general health had been possibly benefited, more by some one of them than by the others. It is, indeed, the general health which is

to be principally considered, and often, through improvement of this, the progress of the local disease is arrested, sometimes for many years, and even the nodosity is occasionally greatly reduced.

Gonorrhœal rheumatism

13. In *gonnorrhœal rheumatism and other 'pseudo-rheumatisms'* there is nothing special with regard to balneo-therapeutics. If, after the cure of the exciting cause by ordinary treatment, swelling and tenderness about the joints, tendon sheaths or fasciæ remain, the condition may be treated similarly to the conditions left behind by acute articular rheumatism (Section 10).

Gout and gouty conditions

14. *Gout* is of very different import in different individuals. Spa treatment is in numerous gouty persons absolutely unnecessary, excepting in so far as many people can be induced at spas to carry out the necessary rules of diet and regimen, while they object to them at home.

On the other hand, it may be said that according to the different states of constitution, and according to existing complications, almost all the spas and climates of Europe may be rendered now and then very useful to gouty people. It would take a little book to exhaust this subject.

If we allow, as seems probable, that one of the main factors in the pathology of gout is the deficient excretion of uric acid and its salts, it becomes easy to understand how the eliminative action of various (external) balneo-therapeutic and hydrotherapeutic processes can be employed with advantage according to the individual manifestations and reactive powers of different patients. The same applies to exercises and massage, if care be taken in the discrimination of individual requirements. In regard to internal courses of mineral waters we believe that, in many cases at least, the beneficial effects of waters containing sodium salts may outweigh the disadvantages, which, according to the researches of Sir William Roberts and others, are due to the sodium.

In many weak persons only climatic changes and

the simple thermal spas (Chapter VI.), the muriated (Chapter VII.), and muriated alkaline waters (Chapter IX.) can be used, and these only in a cautious manner, especial care being taken in old and debilitated persons and in those affected with arterio-sclerosis.

In so-called plethoric constitutions with abdominal plethora and tendency to obesity, the sulphated waters (Chapter XI.) or the sulphated alkaline waters (Chapter X.) exercise the best effect, provided a long rest in alpine or sub-alpine climates (Chapter XVIII., Groups I. and II.) can follow the use of the waters. The alkaline sulphated waters are especially useful in plethoric cases with uric acid deposits. If the tendency to uric acid exists without marked abdominal plethora or congestion, a course of Contrexéville is considered most beneficial by many, especially French physicians; and again by others the alkaline group (Chapter VIII.). In many gouty persons, without pronounced obesity, and with sluggish intestinal action, the muriated waters (Chapter VII.) are preferable to the sulphated. The combination of sulphur with muriated waters, as at Harrogate, Llandrindod, Aix-la-Chapelle, Uriage, etc., forms no objection to their being recommended in gouty persons, with or without abdominal congestion. In gouty eczema the muriated alkaline (Chapter IX.) and the sulphur waters (Chapter XIV.) are useful, and amongst the former, Royat has established a reputation, amongst the latter, Schinznach and Uriage; frequently, it must be added, the cure is not permanent. This, however, is more or less the case with all gouty complaints, especially if the gouty persons relapse into their faulty habits.

For older patients and in asthenic gout, Sir Dyce Duckworth [1] finds warm sea-water baths and douches of undoubted value, and in strumous gouty cases he recommends recourse to the seaside for some weeks each summer. He draws special attention to the benefit which many gouty patients derive from travel, especially

[1] *A Treatise on Gout*, London, 1890, p. 448.

in dry, temperate, hill and mountain climates, and sometimes also from sea-voyages, although, in the latter case, the tendency to over-eat and take insufficient exercise is often a disadvantage.

Obesity

15. *Fat persons* often think that a course of waters can reduce them to average size; but this is rarely the case without a strict arrangement of diet, exercise (ordinary, or by Swedish gymnastics or massage), and general regimen, which might in most cases be done at home. According to F. Hirschwald, at the commencement of a 'cure' for obesity, an increased loss of albuminous material, as well as of the fatty constituents of the body, can often be ascertained by observations on the metabolism. This is likely to be especially marked in persons who, previously to the commencement of treatment, have had a diet very rich in nitrogenous material. According, however, to Dapper and von Noorden, if the previous diet was poor in nitrogen, the excessive loss of albuminous material is less marked or absent, especially if care be taken to give sufficient nitrogenous food. During the cure, the loss of fat may proceed, as Dapper has found, without excess in the albuminous catabolism. The sulphated (Chapter XI.) and sulphated alkaline waters (Chapter X.) are able to assist the dietetic and other treatment. With a suitable limitation of diet the combination of regular muscular exercise and hydrotherapeutic methods, as recommended by Winternitz (*Blätter für klin. Hydrotherapie*, December, 1897), must be very useful in many cases. In some cases the obesity may be considered not so much due to laziness and over-indulgence in food as to a peculiar condition of diminished metabolic activity, somewhat analogous to that in myxœdema. To this class belong the cases of obesity following severe illnesses (typhoid fever, &c.) and other debilitating conditions,[1] including many of the cases in pale pasty individuals. In this 'torpid' class of obese persons, the cautious use of

[1] Some of these cases may be compared to the obesity following after prolonged privation, such as those cases noted after the siege of Paris.

thyroid preparations has been recommended on account of their effect in increasing metabolic action. In the same class of cases, and for the same reason, tonic climates and courses of gaseous muriated or gaseous iron baths might be found useful. The gaseous baths are especially to be preferred in cases where the action of the heart is weak. When there is considerable anæmia in addition to obesity (frequently the case in women) chalybeate remedies may be of use. The compound chalybeate waters containing sulphate of sodium, such as the Ferdinands-Brunnen of Marienbad, the Stahlquelle of Franzensbad, and the Marienquelle of Elster, are often preferable to pure chalybeate springs. The iron contained in some of the common salt springs of Homburg and Kissingen, in the muriated alkaline springs of Royat, and in some of the alkaline springs of Vals, will also occasionally be useful in cases of this class. The fresh air and sunlight of country life (notably *cool dry* atmospheres) assist the cure by furthering the tissue changes. Too much sleep (section 49) must naturally be avoided.

Climacteric changes

16. Although the seven ages of Shakespeare cannot be always distinctly recognised, and are not sharply separated from one another, we all must acknowledge different stages in the lifetimes of men and women; and the passage from one to another is in some persons attended with more or less serious troubles. The equilibrium of such invalids is easily disturbed, and slight injurious circumstances may produce effects altogether out of proportion to the cause. It is not necessary in the majority of instances to resort to spa treatment, but change of air is mostly beneficial; and occasionally this can be advantageously combined with treatment at simple thermal (Chapter VI.), or at chalybeate (Chapter XII.), or arsenical spas (Chapter XIII.), especially when the spas are in elevated situations. In persons with a fair amount of strength, the alpine climatic resorts (Chapter XVIII., Group I.) by themselves deserve repeated trials.

Premature old age

17. The senile degeneration of tissues, organs, and functions manifests itself in different persons at different ages. In advanced or old age almost all the tissues are inclined to waste, and the functions become inactive. This is especially the case with the involuntary muscular tissues and the organs of the circulatory system, principally composed of them; and as the nutrition of all the tissues and organs depends on the health of the nutritive blood-vessels, the decay of the latter leads to deterioration of the different organs and functions. This shows itself in some persons more in one system, in others more in another. The tendency to early decay of the one or the other system is often hereditary, and can be recognised long before old age is due in the natural course of events.

Many persons ask for advice about what they think to be disease, while it is in reality only a manifestation of premature old age in one or another part of the body.

Much can often be done to ward off old age and prolong the life of the whole organism, and of the particular part of the body which shows the tendency to early decay. We all have the opportunity of watching this in the muscular system, in the joints, in the skin, in the urinary organs, in the general nutrition of the body, and in the brain functions.

The means to prevent and, to some degree, to remove premature old age of the whole organism are to be found more in other management than in balneo-therapeutics. The judicious arrangement of diet, general regimen, and especially of exercise and occupation, has a very powerful influence. Milder and warmer winter climates are often needed. Not rarely during summer the simple thermal spas (Chapter VI.) can be used with great advantage, especially those situated at higher elevations, and the benefit to be derived from them may be greatly increased by the assistance of Swedish gymnastics and massage and gentle climbing exercise; and if this cannot

be had, by respiratory exercises which indirectly act on the heart and entire circulation.

Some health resorts have become celebrated by the repeated visits of aged statesmen and princes: Ems and Gastein were favourite resorts of the German Emperor William I., and Wildbad was constantly visited by Prince Gortschakoff; the first Lord Brougham spent the winters of his later years at Cannes. The wintering in warmer climates lessens the demands made on the weakened organism, and affords gentle stimulation to the mental faculties.

Diseases of the Digestive Apparatus.

Dyspepsia

18. *Dyspepsia* is a term applied to numerous different conditions, which are associated with disturbance in the digestion of food. In its broadest sense it signifies, as Dr. W. H. Allchin[1] says, 'Some perversion of the function of digestion, wherever in the alimentary canal, whether mouth, stomach or intestines, this may take place, whatever may have been its cause, and whatever may be its symptoms.' We will here, however, refer to some conditions, such as chronic intestinal catarrh, under a separate heading, though they might be included under this broad definition of dyspepsia.

Dyspepsia is in many persons only a manifestation of a *weak mucous membrane*, in which participate more or less all the mucous membranes of the body, and which again is intimately allied to and forms part of a weakness of the nervous system. The majority of such invalids are thin, and have little resisting power. Mental or bodily exertion is apt to produce or to aggravate the dyspeptic troubles. It often forms a prominent part of neurasthenia. Many such cases are alluded to as 'nervous dyspepsia'; in fact this term is frequently employed for ordinary gastric ailments, when they arise from particularly slight causes in neurasthenic or hyper-

[1] *Lancet*, 1897, vol. ii. p. 1031.

æsthetic individuals. No energetic spa treatment is suitable to such invalids, but the general management may be beneficially assisted by the simple thermal waters (Chapter VI.), especially those in elevated situations; sometimes by a very gentle use of the muriated waters (Chapter VII.) or the muriated alkaline waters (Chapter IX.), followed by a long stay at mountain health resorts (see Chapter XVIII., Groups I. and II.).

In addition to those kinds of *nervous dyspepsia* which are due to an individual congenital weakness or gastric hyperæsthesia, and which have just been mentioned, there are other kinds excited by overwork, worry, &c. The most troublesome cases occur in persons of advanced years, as one of the results of nervous exhaustion from long-continued brain work and insufficient sleep. Such cases are often benefited by mental rest at simple thermal spas, such as Wildbad-Gastein, Wildbad in Würtemberg, Schlangenbad, Plombières, and Ragatz. The spas of higher elevation are generally preferable. Mere climatic health resorts of moderate elevation are often equally useful.

In *atonic dyspepsia*, when catarrh and irritability are not apparent, very slight courses at common salt or chalybeate spas, and residence in tonic climates are often successful. Seaside localities, combined or not with sea bathing, are likely to give good results.

Dyspepsia alcoholica is the result of a specific catarrh of the mucous membrane of the digestive system, which requires above all things abstinence from its cause, namely, alcoholic beverages, or, at all events, the greatest moderation in their use. The catarrh itself and the complications, if this primary condition is fulfilled, are ameliorated and gradually cured, according to individual indications, by sulphated alkaline (Chapter X.), muriated alkaline (Chapter IX.), or muriated (Chapter VII.) waters, followed by residence at moderate elevations (Chapter XVIII., Group II.). We shall later on return to the subject of chronic gastric catarrh. For cases

associated with cirrhosis of the liver we refer to Section 26 of this chapter.

The *dyspepsia of smokers* seldom requires balneo-therapeutic treatment, but the waters just mentioned are sometimes helpful.

For the numerous forms of *dyspepsia in gouty persons* we refer to what has been said on the management of gout (Section 14).

The dyspepsia attendant on *habitual constipation* is to be removed by the treatment of the latter condition (Section 20).

The dyspepsia of *anæmia* is likewise sometimes caused by chronic constipation; but is frequently due to malnutrition of the mucous membrane from the imperfect composition of the blood. In deciding on the treatment (Section 3) the question of there being an actual gastric ulcer has to be considered.

The dyspepsia of the *early stage of pulmonary tuberculosis* requires the climatic, dietetic, and general hygienic management of this affection (see Section 4 of this chapter).

Chronic gastritis

Chronic catarrh of the stomach (chronic catarrhal or inflammatory dyspepsia) is frequently due to over-feeding (eating too much or too frequently), the abuse of alcohol, or a too stimulating diet. In such cases it frequently follows, or fills in the intervals between, repeated acute or subacute attacks. It is often dependent on passive venous congestion caused by chronic cardiac, pulmonary, or hepatic disease.[1] It may be associated with gout, the

[1] Gastro-intestinal catarrh is, however, often not so much a result of chronic hepatic and renal disease, as a predisposing cause of these diseases. It favours putrefactive changes in the gastro-intestinal contents, and the mucous membrane becomes in its diseased condition more permeable to the passage of the products of decomposition. The latter are therefore absorbed into the circulating blood, and so act harmfully on the liver and kidneys. (See also N. Tirard, *Lancet*, 1896, vol. ii. p. 377.) Indeed much more indican (one of the results of intestinal putrefaction) can sometimes be found in the urine during inflammatory attacks associated with diarrhœa, than is found even during obstinate constipation.

uric acid diathesis, chronic interstitial nephritis, habitual constipation, or menstrual irregularities, *i.e.* it may be induced by diminished excretion or be associated with disturbances of the general metabolism. It is often accompanied by intestinal catarrh (chronic gastro-intestinal catarrh), and in some individuals, usually of gouty families, a subacute form seems to be the usual reaction to irritant food or overstrain from a too copious diet, just as in certain persons eczema of the fingers may be regarded as the almost natural reaction on washing the hand with irritant soaps or antiseptic solutions.

In the treatment of chronic gastric catarrh obvious causes, such as over-eating and the abuse of alcohol, must be avoided by an arrangement of diet.[1] The gastric circulation should in most cases be increased by well-regulated active or passive exercise, walking, climbing, cycling, &c., and constipation, if present, must be got rid of by suitable means. Mineral waters are often of use in promoting the action of the bowels and the renal secretion. There may be a nervous element in the ætiology, and this can sometimes be remedied by the mental rest and diversion of spa-life. In the more robust and full-blooded persons sulphated alkaline waters (Karlsbad, &c.) or common salt waters (Kissingen, &c.) are preferable, whilst the sulphated and muriated-sulphated (Hungarian bitter waters, Friedrichshall, &c.) are often serviceable for home use. In weak subjects, simple thermal spas may sometimes be tried. When associated with the uric acid diathesis earthy waters such as those of Contrexéville are sometimes of use, or a course of nearly pure water such as that of Evian-les-Bains, or of one of the gaseous so-called

[1] We cannot refrain from quoting Dr. L. Brunton's summing up on this head. 'The patient must avoid alcohol, sugar and condiments, eat fat sparingly, chew slowly and masticate thoroughly. Liquids and solids should not be taken together; and, if necessary, farinaceous and proteid foods must be taken at different times. The body should be kept warm, the mind easy, and the bowels open.' (Professor Clifford Allbutt's *System of Medicine*, 1897, vol. iii. p. 423.)

'table waters' (Chapter XVI.); or the regular use of hot water or of distilled water (when the ordinary water is hard) may be tried. For the possibility of appropriate spa-treatment, when heart disease is the chief predisposing cause of the gastric catarrh, we refer to the section on dilated heart (see Section 35 of the present chapter). In some cardiac conditions, however, as well as in advanced renal disease and cirrhosis of the liver, spa-treatment is unsuitable. In the tonic after-treatment of gastric catarrh chalybeate waters, hydrotherapeutic measures, and a stay in some climatic health resort (see Chapter XXI.) may be of use. There are cases of chronic gastro-intestinal catarrh which might well be treated climatically very much as cases of chronic catarrh of the respiratory organs, the sedative climates for irritable subjects, and the dry tonic climates for the scrofulous and torpid class. It need scarcely be stated that in many cases of gastric catarrh ordinary pharmaceutical treatment can often assist spa-treatment and vice-versâ.

Dilated stomach

Chronic dilatation of the stomach may be due to mechanical causes, such as cancerous stricture of the pylorus, or may be due to paralysis of the muscular coats, and like vesical disturbances occasionally form one of the first signs of tabes dorsalis; these kinds of gastrectasy do not concern us. Symptoms are often supposed to be due to chronic dilatation of the stomach, which are really only temporary phenomena in the course of acute or chronic gastritis, and treatment of the gastritis suffices for their cure. Chronic dilatation may be present unsuspected, until an attack of gastritis or a careful examination reveals it; and in regard to many cases the boundary between what is called atonic dyspepsia and actual dilatation is not very definite. For washing out the stomach, when this is advisable (as in some cases of chronic dilatation following or associated with chronic gastric catarrh), an alkaline water, such as Vichy, may be used, but this treatment can be carried out at home as well as at the spa, though the mental

distraction of spa-life is sometimes useful. Lesser degrees of gastric dilatation are probably often present in the course of chlorosis and cachetic conditions, but call for no special treatment. In such cases drinking quantities of fluids, notably cold effervescent fluids (including artificial and natural gaseous waters), is harmful, especially during the latter part of the day.

Abdominal plethora

19. '*Abdominal plethora*'[1] (abdominal venosity) is mostly due to sluggish portal circulation in persons with a weak venous system. It often leads to chronic catarrh of the intestines, and especially of the rectum,[2] and to various forms of hæmorrhoidal troubles. Over-indulgence in food frequently helps in the production of abdominal plethora, and restriction of food and fluids—the latter especially at meal-times—is a necessary part of the treatment. Regular muscular exercise is equally important, and doubtless the increased respiratory movements which necessarily accompany active exercise facilitate the return of blood from the abdominal veins; sometimes abdominal massage may likewise be of use. General rules on these subjects should be adhered to not only during the cure and after-cure, but ought to become habits of life.

In obese and plethoric gouty persons the condition is mostly treated with benefit by the sulphated (Chapter XI.) and the sulphated alkaline waters (Chapter X.). In only moderately nourished or lean subjects the muriated (Chapter VII.) or muriated alkaline (Chapter IX.) waters are preferable. The sulphur waters with common salt, such as Harrogate, Llandrindod, Aix-la-Chapelle, and

[1] By the term 'abdominal plethora' some authors understand merely a prominent and tense abdomen due to excessive development of fat in the omentum and abdominal walls.

[2] The chief predisposing cause of the chronic catarrh in these cases is doubtless the retarded circulation of blood through the capillaries of the bowel. In the same way the retarded flow of blood through the cutaneous capillaries leads often to pigmentation, chronic eczema, chronic ulcers, and sclerosis of the subcutaneous tissue, in the legs of persons with varicose veins of the lower extremities.

Uriage, likewise often exercise beneficial effects. Even simple sulphur waters, such as the thermal Pyrenean spas and the cold sulphur waters of Weilbach and Nenndorf (see commencement of Chapter XIV.), are not rarely used with great advantage in weakly persons. This is in accordance with the general experience that pharmaceutical preparations of sulphur are very useful in the treatment of piles and chronic catarrh of the rectum. Residence at moderate elevations (Chapter XVIII., Group II.) ought always to follow the spa treatment.

For cases in which abdominal plethora is due to actual heart diseases or cirrhosis of the liver, we refer to the paragraphs on those heads.

Habitual constipation

20. *Habitual constipation* is due to different causes, and in many cases mineral waters are useful. Stout persons require treatment by sulphated or sulphated alkaline waters, while in leaner persons the muriated waters often produce improvement, though this is not rarely only temporary. The treatment must be continued for a month and often longer, and must not be left off suddenly, else hæmorrhoids may be produced. Fair trial ought always to be given to arrangement of diet and ordinary methods of exercise (walking, riding, cycling, climbing, rowing or swimming),[1] before spa treatment is resorted to. Massage (abdominal or general) and gymnastics are likewise often preferable to the latter.

[1] In regard to the effect of exercise on constipation an apparent exception must be noted in the fact that persons of sedentary occupations occasionally suffer from constipation at the commencement of an active holiday. A probable explanation is the following. The slimy mucus in the large intestine is often secreted in excess in sedentary individuals with weakened intestinal peristalsis, and this condition in extreme cases almost amounts to what has been termed 'mucous disease of the lower bowel.' Owing to exercise during the holiday the circulation is improved in the blood vessels of the alimentary mucous membrane and the tendency to catarrhal secretion is thereby diminished. The diminution of the slimy mucus at the commencement of the holiday is likely to cause constipation, until sooner or later the general tonic influence of the more healthy mode of life induces better peristaltic action of the intestines. Change of diet, &c., offers an equally probable explanation in other cases.

It is probable that disagreeable symptoms are often attributed to constipation which are really due to the fact that associated catarrhal conditions favour the passage into the circulation of putrid products from the contents of the bowel. We shall refer to this subject in its bearing on spa treatment, when we come to the various kinds of 'headache' (see Section 46 of this chapter).

Hæmorrhoids

In *Hæmorrhoids*, as far as balneo-therapeutic treatment is concerned, we must likewise consider whether an invalid is stout or lean, and use similar treatment to that recommended in the preceding sections on abdominal plethora and habitual constipation. It is doubtless in cases associated with abdominal plethora and habitual constipation[1] that mineral waters are of chief use. Alteration of regimen is often essential.

Catarrh of the intestines

21. *Catarrh of the intestines* may be caused by different conditions, and the treatment must vary accordingly. If it is the result of constipation or injurious dietetic habits, these must be remedied. If it is caused by a weak mucous membrane and shows itself by *habitual diarrhœa* or frequent attacks of diarrhœa, the management suggested under dyspepsia from weak mucous membrane (Section 18) holds good. The amount of waters taken internally ought to be very limited, and the whole course, including diet, ought to be carefully superintended by the spa physician. The so-called *mucous disease* of the large intestine or *muco-membranous colitis* ('entérite muco-membraneuse,' &c.) in adults is perhaps a variety of chronic catarrh, specially affecting the glandular apparatus of the mucous membrane and

Chronic diarrhœa

[1] The view, however, that hæmorrhoids are merely varicose enlargements of the hæmorrhoidal veins produced or aggravated by habitual constipation and passive congestion, cannot be regarded as established in all cases. G. Reinbach (*Beiträge zur klinische Chirurgie*, 1897, vol. 19, p. 1) regards hæmorrhoids as angiomatous tumours, the rational treatment of which is their complete surgical removal. It may be questioned, however, whether the new formation of vessels, on which Reinbach bases his theory, is not simply analogous to the great development of the 'vasa vasorum' observed in the walls of varicose veins elsewhere.

occurring in predisposed individuals; it may possibly be regarded as the result of continual reaction to irritation of the large intestines, produced by constipation from sedentary habits, &c.[1] The waters and baths of Plombières have acquired a great reputation in the forms of chronic diarrhœa with weak mucous membrane. Milk cures, or modified forms of milk cures, may be of use.

Chronic catarrh of the rectum

Chronic catarrh of the rectum, when it is not dependent on diseases of the heart, liver or kidneys, or on local ulceration or tumour, is usually associated with hæmorrhoids, habitual constipation, or over-indulgence in eating and drinking. It requires the treatment mentioned under these heads.

Tropical diarrhœas Hill diarrhœa

22. If the diarrhœa is connected with *malaria and dysentery*, the spa treatment can take only a small share in the management. This is also the case with the affection called by Indian doctors *hill diarrhœa*. It frequently happens that the internal use of waters is at first worse than useless, and that only the simple thermal baths at the higher elevations are permitted, while in old cases the muriated alkaline (Chapter IX.), the simple muriated (Chapter VII.), the sulphur (Chapter XIV.), and in rarer instances the sulphated alkaline waters (Chapter X.) can be recommended. The doses of alkaline waters ought to be very small, and the spa treatment ought always to be followed by long residence at high localities with a dry soil. We ought to add that in some very chronic cases with well-marked anæmia, arsenic waters (Chapter XIII.) have proved beneficial. In *psilosis* or sprue, according to Dr. Thin,[2] a milk diet, and avoidance of chills, constitute the chief part of the treatment.

Gastric ulcer

23. *Chronic ulcers of the stomach or duodenum* require dietetic treatment, but the dietetic treatment can be occasionally assisted by the most careful use of alkaline

[1] It has however been suggested that some cases are due to the mechanical injury of visceral nerves by tumours, peritoneal adhesions, &c., outside the gut.

[2] See *Psilosis or Sprue*, second edition, London, 1897, p. 131.

(Chapter VIII.) and warm sulphated alkaline waters (Chapter X.), especially those of Karlsbad.

Congestion of the liver

24. Congestion and enlargement of the liver from abuse of alcohol or from malarious affections, or from sluggish portal circulation, or from dilatation and imperfect contractions of the heart, must be treated according to the most prominent cause; but in almost all cases the judicious use of alkaline (Chapter VIII.), and sulphated alkaline waters (Chapter X.), if the individual is stout, and of muriated waters (Chapter VII.), if the invalid is thin, acts beneficially. The congestion, consequent on dilatation and imperfect contraction of the heart, requires especially careful management, similar to that mentioned under dilatation of the heart (see Section 35 of the present chapter).

Gallstones and allied affections

25. From various researches [1] on the origin of gall-stones it is clear that the chief causes of their formation are: (1) catarrhal conditions of the bile ducts and gall bladder, whether due to the local presence of microbes or not; and (2) delayed flow of bile. In order, therefore, to get rid of the causes of the complaint the circulation of blood in the liver may be accelerated by exercise, the flow of bile may be promoted by the ingestion of suitable quantities of liquid, and intestinal disorders may be remedied by appropriate diet, exercise, massage (local or general), mineral waters, &c. (see Sections 18 to 21 of this chapter).

As a matter of fact gall-stones and allied affections, as inspissated bile and bile sand, are generally benefited by the sulphated alkaline (Chapter X.) and the alkaline waters (Chapter VIII.), especially those of higher temperatures. The earthy waters (Chapter XV.), which can be taken in very large quantities, exercise likewise often beneficial effects, principally by the washing out of the small ducts. All these waters dilute the bile and seem to counteract catarrh of the ducts.

[1] See 'On the Causation of Cholelithiasis,' by Dr. William Hunter, *Brit. Med. Journal*, Oct. 30, 1897.

Dr. W. Hunter [1] rightly points out that, in order to get the best action of fluids in diluting the bile, care should be taken to give it apart from food, for food by itself causes an increased flow of bile. If the fluid be given at night, several hours after the last meal, it acts at a time when there is a natural tendency for the bile to become especially concentrated. In impacted gallstones mineral waters cannot take the place of surgical management.

Cirrhosis of the liver

26. *Cirrhosis of the liver* in the earlier stages is often greatly benefited by the same treatment which has been suggested under the head of congestion of the liver. In the more advanced forms of the disease spa treatment can only have a palliative effect.

We need hardly allude to those cases in which syphilis is the cause of cirrhotic changes in the liver, and in which ordinary spa treatment is more or less useless. (See Section No. 5 of this chapter, on Syphilis.)

Jaundice

27. *Jaundice*, in its very chronic forms, is not rarely treated at spas; it is benefited principally in those cases which are connected with catarrh of the bile ducts; these cases require a similar general management to that discussed under the paragraphs (Sections 24 and 25) on chronic congestion of the liver and gallstones, and as regards spa treatment, the same rules hold good. Spa treatment is not applicable to carcinomatous affections, but in some instances it is very difficult to distinguish whether jaundice is due to the more ordinary causes, such as chronic catarrh of the bile ducts and plugging by inspissated bile, bile sand, or biliary calculus, or whether it is due to obstruction in the bile ducts from cancer. In such cases a very cautious trial of the alkaline or sulphated alkaline waters is permitted, and we know of a number of cases where distinguished physicians had given their opinion for new growth, and where we were ourselves uncertain, when Karlsbad and Vichy have effected a cure, and thus cleared up the diagnosis. When due precaution has been exercised and the diet carefully

[1] Allbutt's *System of Medicine*, vol. iv. p. 18, London, 1897.

arranged, we have seen no harm result from the trial of a spa in these doubtful cases, even if, later on, the carcinomatous nature of the disease showed itself indubitably.

Ascites

28. *Ascites*, or dropsy of the peritoneum, is one of the affections for which relief is rarely sought from spa treatment, and the proportion of cases in which such treatment can afford relief is only small. When ascites is caused by compression of the portal vein through new growth, or is due to disease of the kidneys, or to tuberculous affection of the peritoneum, balneo-therapeutic treatment ought not to be attempted. When cirrhosis of the liver is the cause of ascites, the cirrhotic affection is mostly far advanced, but in some instances it occurs rather early in the disease, and then the treatment mentioned previously for congestion and commencing cirrhosis of the liver is occasionally beneficial. It is especially in cases where the liver and the portal circulation have been affected through dilatation of the heart, that we have seen some real cures follow spa treatment, and this principally from the use of thermal gaseous muriated waters, like those of Nauheim and Oeynhausen (Sections 35 and 36). Such cures we have seen, not only from the system of combined treatment by baths and exercises, but long ago from the use of the baths at Nauheim, before the exercises had been introduced.

Chronic remnants of localised peritonitis and appendicitis

Simple thermal baths can sometimes be employed for the *after-results of localised peritonitis*, particularly about the pelvic viscera (perimetritis or peri-parametritis). The remnants of typhlitis and perityphlitis (appendicitis) are sometimes treated by thermal baths at Plombières.

Enlargement of the spleen

29. *Enlargement of the spleen*, if caused by *lymphadenoma* or Hodgkin's disease, is scarcely ever benefited by spa treatment; and the same may also be said of the splenic tumour of *leucocythæmia* or *leukæmia*.

The enlargement resulting from enteric fever, erysipelas, septicæmia, puerperal fever, anthrax, and acute tuberculosis, does not fall into the sphere of balneotherapeutics.

The splenic tumour caused by malarious affections is referred to under the head of malaria (Section 7).

The very rare cases of simple idiopathic hypertrophy do not require spa treatment, and for the splenic enlargement connected with cirrhosis of the liver we need only refer to the section concerning the latter affection (Section 26).

Diseases of the Respiratory Organs.

Chronic nasal and naso-pharyngeal catarrh

30. *Chronic nasal* and *naso-pharyngeal catarrh*, if not caused by adenoid or polypoid growth, or syphilitic disease, may be treated by the internal use of muriated, sulphur, and arsenic waters, and by pulverisation with the spray of these waters or by douches which wash out the nasal passages and pharynx. Cauterets and Mont-Dore have acquired considerable reputation, but the cures are rarely permanent. Marlioz (near Aix-les-Bains) and Challes are likewise well known for these classes of cases. One or more winters spent at dry, warm localities, such as Egypt and the Riviera, and long sea voyages, often do more good than waters, but the latter made use of during summer may be combined with, or rather followed by, the former, during winter.

Chronic pharyngitis and chronic laryngitis

In *chronic pharyngitis* and *chronic laryngeal catarrh*, exciting causes of these affections must be avoided, dusty and impure air, tobacco smoking, alcohol, and excessive use of the voice (*e.g.* in clergymen, public speakers, singers, &c.) ; other factors frequently present in such cases, anæmia, goutiness, obesity, general debility, dyspepsia, chronic intestinal catarrh, and habitual constipation, can be treated by the methods mentioned under the respective headings, and thereby an improvement in the local condition indirectly induced. Local treatment is useful in many cases, and warm equable fairly moist climates during winter are often advisable. Amongst spas for the so-called 'clergyman's sore throat,' and allied

conditions, Cauterets in the Pyrenees and Mont-Dore in the Auvergne have obtained a considerable reputation.

Chronic bronchial catarrh

31. *Chronic bronchial catarrh* or chronic bronchitis, if it is free from complications and merely the result of neglected acute catarrh or repeated acute catarrhs in persons with a weak mucous membrane, can be treated with benefit by the muriated-alkaline, the weaker alkaline and the muriated waters (Chapters IX., VIII., and VII.), especially Ems, Gleichenberg, Royat, Neuenahr and Baden-Baden, or by the sulphur waters (Chapter XIV.), such as those of Uriage, of Aachen, of the Pyrenees, of Schinznach, of Saint-Honoré, &c., or by the weak arsenic waters, as La Bourboule and Mont-Dore. Weissenburg in Canton Bern acts likewise often beneficially, doubtless in great part owing to its peculiar position and consequent climate. If the bronchitis is complicated with gout or a gouty diathesis, in weakly individuals the same waters can be employed, while in stout or plethoric persons the sulphated-alkaline or muriated-sulphated (Karlsbad, Brides), or the stronger muriated drinking waters (Kissingen, Homburg, &c.), may be found useful, combined with a suitable arrangement of diet and regimen.

If the chronic catarrh is complicated with a weak and dilated heart, with or without valvular disease, thermal muriated waters, especially in the form of baths (Nauheim and Oeynhausen), are preferable.

In all these cases the balneo-therapeutic treatment ought to be followed by long residence in moderately elevated wooded regions, sheltered from wind, especially near pine forests; for instance, in the Black Forest, the Flimser Waldhäuser in Switzerland, or in sheltered sea-side places.

When there is a rachitic or scrofulous tendency in children with bronchitis or bronchopneumonia, the treatment mentioned in the paragraphs on scrofula and rickets (Section 4 of this chapter) may be adopted after the acute pulmonary complication has subsided.

Pulmonary emphysema

32. *Emphysema of the lungs*, as such, is not likely to be ameliorated by spa treatment,[1] but the more advanced cases, especially in elderly persons, are almost always complicated with chronic catarrh, and then the treatment by muriated alkaline and thermal sulphur waters, just mentioned, is useful. If the heart is much dilated, attention must be paid to this complication.

Remnants of pleurisy and pleuritic effusion

33. After acute pleurisy, especially if associated with pneumonia or broncho-pneumonia, the physical signs are sometimes slow to clear up and there may be deficient expansion of the affected lung. The general health may likewise remain unsatisfactory. Under these circumstances climatic treatment is useful. High altitudes, provided there be sufficient shelter from winds, are to be preferred in many cases, but in patients of an erethic temperament or with injured hearts, who bear such elevations badly, sheltered localities of medium or low elevation may be recommended, or a summer seaside resort. During winter, if Alpine resorts are contra-indicated, the Riviera may be visited, or, when there is an irritable dry cough, one of the moister more equable places, such as Pau or Ajaccio, may be selected. Spa treatment may sometimes be tried during summer, for baths are likely to aid absorption of inflammatory exudation. The simple thermal baths in good situations, or thermal gaseous baths (Nauheim, Oeynhausen and Brides-Salins) are to be preferred. Ordinary brine baths, such as Reichenhall, or muriated-sulphur baths, such as Harrogate, Llandrindod and Uriage, may likewise be useful in assisting absorption. When the pleuritic affection is suspected to be of tuberculous nature, or when it occurs in a scrofulous subject, resorts of high altitude are especially likely to act beneficially, and Dr. Theodore Williams and others have carefully recorded the excellent influence of residence at high elevations in aiding expansion of the chest. In some cases expansion may be promoted by the careful use of local douches or other gentle hydrotherapeutic treatment, or the so-called pulmonary gymnastics.

Passive effusions in the pleuræ, associated with cardiac weakness, may sometimes under careful medical supervision be made to

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[1] Dr. M. Cazaux (*Annales d'Hydrologie*, January 1897) thinks, however, that if the pulmonary infundibula are only dilated, amelioration and even cure can often be hoped for from repeated spa-treatment, especially if the condition is the result of bronchitis. He believes that restoration of the elasticity of the elastic fibres in the walls of the infundibula is possible.

disappear by the spa treatment mentioned in Sections 35 and 36 on cardiac affections.

For *asthma* we refer to Section 54; and for *pulmonary tuberculosis* to Section 4.

Diseases of the Circulatory System.

The majority of diseases of the heart and blood-vessels are not to be treated by balneo-therapeutic means. There are, however, some conditions in which these methods can be employed with advantage.

The heart after rheumatic fever

34. The *heart after rheumatic fever* is often in a very weak and irritable condition, especially when the disease has been complicated with endo- or pericarditis, sometimes with both, or with myocarditis, or with all three combined, and when valvular affections have been set up. We have already discussed this subject to some extent under 'Rheumatism' (Section 10), and have there said that ordinary balneo-therapeutic treatment is hazardous in convalescence from any grave form of rheumatic fever. Only the most gentle and cautious bath treatment is permissible either at one of the simple thermal spas, or, what is still better, at the gaseous thermal muriated waters of Nauheim, though the same might be carried out at the similarly constituted though less known waters of Oeynhausen. The late Professor F. W. Beneke, of Marburg, who practised during summer at Nauheim, was the first to direct our attention to this subject about twenty-five years ago, and under his guidance many of our heart cases derived very great benefit from courses of baths at Nauheim. In the more recent cases of valvular affection, with decided murmurs from the mitral or aortic valves or both, we have repeatedly witnessed the murmur slowly but entirely disappear, and the heart become enabled to undergo a natural amount of exertion. This was, we may remark, at a time when no exercise cure was practised at Nauheim, and when the place was almost unknown out of Germany. It may be remembered,

however, that the disappearance of recent cardiac murmurs in rheumatic cases is likewise sometimes noted in hospital and ordinary treatment at home.

In more chronic valvular affections the murmur has never disappeared in our experience.

Dilatation of the heart

35. In *dilatation of the heart*, with or without valvular affection, the same class of waters is likewise often useful, and not rarely have we seen the heart become regular in action, the area of dulness diminish, the apex beat reappear, and the pulmonary and hepatic troubles, caused by the imperfect contractions, disappear. In a certain number of cases where there was considerable œdema of the legs and effusion into the pleural and peritoneal cavities, these results of the dilated condition of the heart have been entirely removed by long-continued courses at Nauheim. These cures were likewise effected independently of the so-called Nauheim exercises (see under NAUHEIM) now so much brought before the profession and the public. We ought, however, to add that such good results were not obtained in all cases; and further, that the most vigilant supervision by the physician is required in the use of the baths and in the general management of patients of this class.

In cases in which the cardiac condition is mainly a result of, and part of, faulty general nutrition, the treatment has a chance of more lasting success than in cases where the faulty general nutrition is the result of the disturbance in the circulation associated with cardiac valvular defects,[1] adherent pericardium, or atheromatous obstruction in the coronary arteries.

[1] It would be interesting to know the effect of Nauheim and other baths on the excretion of lime salts in the urine. Though calcification may be often regarded as a conservative change, in some cases of old valvular disease the deposition of lime salts in the diseased valves, and the resulting increase of rigidity, probably cause a serious additional strain to be thrown on the cardiac muscle. If any method were known to diminish the tendency to calcification in the cardio-vascular system, benefit might be derived from it in some cases. Rumpf of Hamburg

In regard to the use of the Nauheim baths and exercises in cardiac cases, Dr. Bezly Thorne and others have drawn special attention to the importance of carefully forming an estimate of the reactive powers of each individual patient. This question of 'dosage' is important in all forms of medical treatment, and the success of treatment largely depends on it. It has been suggested that the reason why the Nauheim treatment has so often proved unsuccessful in hospital patients is that such patients have generally less reserve strength to draw on than those of the well-to-do classes.

Valvular disease of the heart

36. *Valvular disease of the heart.*—We have spoken of very recent valvular affections under a preceding head (Section 34). As to old-established affections of the valves, spa treatment has no curative influence on them as such; but the morbid conditions to which they give rise, viz., dilatation of the heart, catarrh of the lungs, congestion of the liver and abdominal organs, may be often relieved. Concerning balneo-therapeutic treatment of these conditions, we refer to what has been already said under their respective heads.

Many persons with minor well-compensated valvular lesions (especially of the mitral valve) can stand exertion almost as well as others, and can in fact live, for a long time at least, in the same way as those in ordinary health. For such persons, when they chance to suffer from affections amenable to spa treatment, the same spas and spa treatment may be recommended as if no cardiac lesion were present, careful supervision of the treatment being of course necessary. In fact, of such patients it might be said they receive

(*Berliner klin. Wochenschr.*, 1897, Nos. 13 and 14) advocates a mixed diet, by which only as much lime salts are introduced into the body as are excreted by the kidneys and the bowel. It is very doubtful, however, whether the question is a really practical one; it certainly hardly concerns balneo-therapeutics. In pericardial calcification, in the extreme cases at least, the calcification seems often to be the result of previous suppuration and is not likely to be affected by treatment.

spa treatment not *because* but *in spite of* their having a cardiac affection.

Fatty and fibroid degeneration of the heart

37. *Fatty and fibroid degenerations of the heart* are somewhat uncertain matters as far as spa treatment, as well as other treatment, is concerned. Whoever knows Sir Richard Quain's or Dr. Kennedy's writings on the subject will feel that the first point to be settled—the diagnosis—is very difficult in the earlier stages, and in the later stages of the disease spa treatment is too hazardous. We think, however, that in some cases, where we were tolerably sure of our diagnosis by the irregularity, weakness, and infrequency of the pulse, coupled with breathlessness on slight ascents, and with tendency to drowsiness and to syncope, benefit has been derived from the cautious internal use of muriated waters, especially those of Kissingen, several times also from the sulphated alkaline waters of Karlsbad, and twice from the employment of the gaseous thermal salt baths of Nauheim. In some other cases, however, and amongst them some where the diagnosis was later on confirmed by the examination after death, we were disappointed by the results of balneo-therapeutic treatment.

In some cases, probably of this class, with prominent anæmic complications, iron waters, as well internally as in baths, have acted favourably. We need scarcely say that in this grave affection, spa treatment must be assisted by climate and attention to the diet, exercise, and mental condition of the patient. Localities of an elevation between 600 and 2,000 feet are preferable as well to higher as to lower elevations, and to the seaside.

Fatty infiltration of the heart

38. *Fatty infiltration of the heart* (to which is sometimes applied the term 'fatty heart') often interferes with the function of the organ. The treatment recommended for obesity is applicable in this condition; but in addition tonics, such as quinine, strychnine, and digitalis, ought sometimes to be employed during the use of the waters, and chalybeate waters are often advisable for after-treatment.

39. *Palpitation of the heart*, without appreciable, permanent structural lesion, is to be regarded as a neurosis, and balneo-therapeutic treatment is only in exceptional cases required. Ordinary home treatment, with attention to the predisposing and exciting causes (including overwork, or relative overwork, working in impure air, improper food, tobacco smoking, anæmia, bad habits, very rapid growth at puberty, &c.), can generally do more than spa treatment; in some cases changes of locality and surroundings, suitable climate, and the removal of the worries and the excitement of social life, are the best curative agents. In some persons, however, dyspepsia is the exciting cause, and for this we refer to what we have said on dyspepsia (Section 18). In others, the circulation in the abdominal, and especially pelvic organs, may be attended to at spas. When anæmia and chlorosis form the predisposing conditions, the treatment ought to be directed to these affections. In hysteria and allied affections with over-excitability in one sphere of the nervous system, and failure of the inhibitive power in another, the simple thermal baths (Chapter VI.) in medium elevations often exercise a very beneficial effect; Schlangenbad has an old-established reputation in cases of this nature. If the palpitation in neurotic cases is combined with mental irritability, high elevations are to be avoided. Palpitation of the heart

If palpitation of the heart is due to Graves' disease, perhaps in an incomplete form or early stage, where the whole complex of symptoms is not fully developed, the remarks made under the head of this affection (see Section 53 of the present chapter) can be referred to.

Other functional disturbances of the heart, such as irregularity in the rhythm, some forms of tachycardia and paroxysmal tachycardia, and hæmic murmurs, do not *per se* come into the consideration of balneo-therapeutics.

40. *Varicose veins* of different parts of the body, especially of the lower extremities, are often connected with Varicose veins

venous congestion of the abdominal organs and habitual constipation, and may be treated by the means recommended under that head (Section 20); but mechanical appliances are seldom rendered unnecessary by the use of baths and waters. In rheumatic and gouty subjects, when there has been actual phlebitis, gaseous saline waters, as well internally as in the form of baths, are occasionally beneficial. There was formerly an idea, which is still entertained by some, that warm baths, both those of ordinary water and those of water from simple thermal springs, act beneficially in cases of varicose veins of the legs, but this is not in accordance with our own experience. Hot baths, as well as local mud and moor baths, may however remedy the neuralgia which occasionally accompanies varicose veins; and H. Thiroux [1] of Saint-Amand has drawn special attention to the benefit derived from the uniform gentle compression and thermality of prolonged mud baths in the trophic disturbances ('varicose eczema,' &c.) so frequently associated with varicose veins.

Fibroid degeneration of the heart and small blood-vessels

41. *Fibroid degeneration* in the small blood-vessels (arterio-sclerosis or arterio-capillary fibrosis), in the early stages, if it occurs in stout and plethoric persons, is, to some degree, benefited by the alkaline sulphated (Chapter X.) and alkaline waters (Chapter VIII.), and in lean persons by the muriated waters. Perfect cures are scarcely to be expected, and the manner of living in such cases has to be permanently altered, so as to prevent, or, at all events, to retard, the further progress of degeneration. The same applies to cases in which early fibroid changes in the heart-walls themselves are suspected; when more advanced changes have taken place, what has been said in the paragraph on fatty and fibroid degeneration of the heart (Section 37) can be accepted here also. Localised fibroid changes in the heart-wall, such as lead to cardiac aneurism, if they could be detected during life,

[1] *Troubles Chroniques de la Circulation Veineuse des Membres inférieurs, leur Traitement par les Boues Thermales.* Paris, 1896.

would, of course, be unsuitable to balneo-therapeutic treatment.

42. *Atheromatous changes*, in the commencement, are to be similarly treated; but in more advanced cases, with atheromatous valvular affections, and when commencing aneurism is feared, the greatest care is necessary in the use of balneo-therapeutic treatment. When there is actual *aneurism*, such treatment is inadmissible. Atheromatous changes

43. *Angina pectoris* is a more debatable subject. Many cases have come before us with the diagnosis of 'angina pectoris.' In some of them the anginoid attacks were clearly due to gastric derangements in persons with a so-called weak heart, mostly a dilated heart. In such cases the management of the diet and regimen, either at home or combined with treatment at spas, such as recommended for dyspepsia or dilatation of the heart (see under these heads), has been mostly successful. In cases when the symptoms were such as to leave a doubt whether there was real angina pectoris (with coronary stenosis) or merely functional trouble, the treatment was in many cases likewise successful; but in others only a more or less temporary success—occasionally for years—was obtained, while later on indubitable and fatal angina pectoris manifested itself. In cases where the diagnosis of angina pectoris is certain, it is prudent to avoid spa treatment and long journeys to spas, excepting perhaps in certain cases where the intervals between the attacks are long, and where the presence of gouty or dyspeptic troubles encourages spa treatment. In the latter cases a trial of spa treatment may be made with careful arrangement of the journey and cautious use of balneo-therapeutic means. Angina pectoris

Disorders of the Nervous System.

Physicians have in former years employed spa treatment in many diseases of the nervous system, but its use in the more serious organic diseases is very limited.

Tabes dorsalis

44. *Locomotor ataxy* or *tabes dorsalis* is a disease for which very different spas are frequently recommended, but the benefit derived is mostly only very moderate. The so-called 'lightning pains,' the dull aching pains and the 'pins and needles' are not rarely mitigated by simple thermal baths (Chapter VI.), the thermal chalybeate baths of Lamalou, and by the gaseous muriated baths, amongst which Oeynhausen has obtained a certain reputation in this class of cases. Similar good results are claimed by Dr. Thiroux for the thermal mud baths of Saint-Amand. As arsenic appears occasionally of some use in tabes, so some persons affected with this disease have derived a certain amount of good from arsenic waters. Sulphur waters, too, have at different times been recommended, but we cannot say that we have seen more good from them than from simple thermal waters. As syphilis is in many instances a prominent ætiological factor in locomotor ataxy, inunction of mercury, combined with the baths at Aix-la-Chapelle, Uriage, &c., has been strongly recommended. We can say that we have repeatedly seen great benefit from this plan, while it has occasionally entirely failed, and we are not sure of a single permanent cure, although the good result has not rarely lasted for a period of several years.

In some rare instances, which have remained stationary for more than twenty years, the use of thermal baths in summer, and yachting during winter in sunny climates, including the Nile, seem to have acted very beneficially.

Paralyses, peripheral neuritis, &c.

45. In the various *forms of paralysis*,[1] excepting those of clearly syphilitic origin, balneo-therapeutic treatment is of very little use, and occasionally even injurious, and in syphilitic cases the treatment at spas is mainly the ordinary specific one. In some cases of old *hemiplegia*

[1] See also the remarks at the commencement of Chapter VI. It is scarcely necessary to say that the false paralysis, due to chronic rheumatism, old injuries to joints, &c., with partial ankylosis, or adhesions about the joints, are not referred to in the above heading.

the simple thermal baths are beneficial by improving the general health, and in a similar way the weak thermal muriated baths of Bourbon-l'Archambault have acquired a certain reputation in this class of cases. Simple thermal baths and thermal sulphur baths may doubtless be of some service in the remains of *peripheral neuritis*, following infectious diseases, &c. (see the remarks at the commencement of Chapter VI.).

In the so-called *apoplectic habitus* in plethoric persons the sulphated waters (Chapter XI.) used internally, and the cold sulphated alkaline waters (Chapter X.) are of some prophylactic value.

Epilepsy, unless it is caused by cerebral syphilis, ought not to be treated by spas. Quiet rural life in a healthy, not too stimulating, inland locality is to be preferred for epileptics.

In the remains of *infantile paralysis* children requiring stimulation may be benefited by muriated baths and tonic climates. The nutrition of the affected muscles may be thus indirectly furthered, as far, at least, as the extent of the nervous lesion permits.

In *progressive muscular atrophy* no good results are known to us from spa treatment.

The same may be said of *pseudo-hypertrophic muscular paralysis*, and of other kinds of *primary muscular dystrophies*.

Headache

46. *Headache* has many varieties, and is produced by many different causes, a few of which are to some degree within the scope of balneo-therapeutic means, while others are not. We will discuss some of the principal varieties.

In headaches caused by *organic disease* in the brain or in the cranium, the treatment in question affords no or very little relief, unless the complaint is of syphilitic origin; the limited share of spa treatment in cases of syphilis is mentioned in Section 5 of this chapter.

Anæmic headache

For the headache connected with *anæmia* we refer to the paragraph on the latter condition (Section 3), and also for headaches caused by long-continued leucorrhœa.

Rheumatic headache

There are headaches which occur in *rheumatic* and *gouty* subjects, and to which the treatment mentioned under 'chronic rheumatism' is applicable; we may add that in this form massage of the neck and scalp is helpful, and that dry climates of medium elevation (Chapter XVIII., Group II.) act likewise beneficially.

Headache from venous congestion

In a great number of cases the headache is probably due to *venous congestion* within the cranium mostly in connection with a weak venous system, either local or more or less general. The exciting causes are mostly in distant parts of the system, and more frequently within the abdominal cavity, and for the balneo-therapeutic treatment we refer to the sections on these causes. Climatic resorts at high and medium elevations, with judicious climbing, are mostly preferable to the ordinary spas.

Headache from constipation and chronic catarrhal conditions of the alimentary canal

Habitual constipation and associated catarrhal conditions of the alimentary canal (see Sections 20 and 21) are a frequent cause of dull headache. It is very probable that the absorption of certain ptomaines, or the imperfect removal of them by the excretory organs, has much to do with these headaches, although we do not overlook the fact that the mechanical sluggishness in the abdominal circulation associated with constipation may have a share in their production. We often find that courses of sulphated (Chapter XI.) and alkaline sulphated waters (Chapter X.) in stout persons, and of muriated waters (Chapter VII.) in lean persons, exercise a beneficial effect in the treatment of this form of headache. Karlsbad, Marienbad, Franzensbad, Tarasp, Kissingen, Homburg, and similar spas have obtained a well-deserved reputation. The treatment, however, must not be confined to the course of waters, but the diet and manner of living[1] must be regulated

[1] It cannot be doubted that the absorption of toxins, produced in the alimentary canal (one form of auto-intoxication), often takes a leading share in the production of headaches and irritability, both when constipation is present and when it is not, but especially in the former case.

while at home. In many of these cases exercise ought to form an important habit of daily life, and if the

In many cases the toxins are absorbed not so much owing to the stasis of the contents of the bowels as owing to some catarrhal or other abnormal condition of the mucous lining facilitating abnormal absorption. This explains why in cases of chronic obstruction in the large intestine there need be no toxæmic headache, whereas in cases of diarrhœa, with intestinal catarrh, the urine is likely to give undoubted evidence that products of decomposition are being absorbed from th intestines. The exact nature of the toxins, and fermentations giving rise to them, and the conditions which favour these fermentations, are at present very imperfectly known, though with regard to the question of diet further knowledge on these points would be useful. Excessive fermentation in the bowels is doubtless often due, not so much to the exact quality of the ingesta, as to excessive quantity. If the amount ingested is excessive, though the intestinal secretions may be normal, they are yet relatively insufficient for the quantity of food. Exercise may remedy some of these states of affairs without any alteration in diet, either by improving the circulation in the mucous membrane and thus indirectly allaying catarrh, and checking the undue fermentation, or by aiding the oxidation and excretion of the toxins after their absorption. Often the mere decrease in the total amount of the food, and the eating it more slowly and at more regular intervals, may suffice to check the abnormal fermentation. In other cases the diet has to be modified to suit the individual digestive and metabolic weaknesses of the patient. The temporary change from a chiefly carbo-hydrate diet to one consisting mostly of proteids and *vice versâ*, probably acts partly by giving temporary physiological rest to certain groups of cells concerned in the nutrition of the body, and increasing the activity of others (compare article by F. P. Weber in *Treatment*, 1897, vol. i. p. 444). An excellent example of a change in physiological activity brought about by a change in diet is furnished by the experiments of A. Walter (Abstract from the *Bolnitschnaja gaseta Botkina*, No. 45, in the *St. Petersburger Med. Woch.*, February, 1898), showing that the pancreatic secretion varies qualitatively accordingly as fat or bread is ingested. Dr. Brunton thinks that the beneficial effect of a sudden change in diet may be due to an action on parasitic microbes in the intestine, these latter failing to adapt themselves to their changed surroundings and being actually 'starved out' (Lauder Brunton, 'On Constipation and Diarrhœa,' *Lancet*, May 30, 1896). Dr. G. Thin (*Brit. Med. Journ.*, 1897, vol. ii. p. 1636) suggests a very similar explanation to account for the wonderfully beneficial action of a milk diet in certain cases. He thinks that in such cases the harmful diet forms a better pabulum for some abnormal kind of fermentation in the bowels. Hirschler's experiments also tend to show that a sort of antagonism exists between carbohydrate and albuminous fermentation in the intestines; and Ortweiler ascertained that an indican reaction in the urine caused by albuminous fermenta-

subject were properly considered we should not find the great unwillingness to obey this rule. Exercise (for instance, walking, riding, cycling, lawn tennis and active games) not only acts on the muscles and blood-vessels of the lower limbs and abdomen, but it increases respiratory movements and the amount of oxygen inhaled (open air exercise is generally best) and absorbed by the blood, and through this favours the oxidation of albuminoid substances and ptomaines; it also strengthens the capillaries and veins not only of the lower part of the body, but also those within the cranium.

Headache from uræmia and cholæmia

There are other forms of headache from imperfect metabolism and excretion, which may be classed under toxæmic headaches, especially those from disease of the kidneys, included in the different degrees of *uræmia*, and of the liver, in minor varieties of *cholæmia*. In the pronounced forms there is no possibility of spa treatment, but in the slighter forms mineral waters can influence the excretions, and the sulphated alkaline (Chapter X.) or muriated (Chapter VII.) waters, given according to individual peculiarities, will be found beneficial, whilst in other cases waters acting on the skin (as the simple thermal) may do good.

Headache from alcoholism

A form of toxæmic headache is that sometimes attending *alcoholism*. The ordinary transitory alcoholic headache cannot come into consideration, but for the chronic form, when connected with dyspepsia or alcoholic cirrhosis, we refer to the paragraph on alcoholic dyspepsia (Section 18). When the chronic alcoholic headache is due to organic changes in the brain or meninges, in addition to removal of the primary cause, climatic treatment and simple thermal waters may effect a certain amount of improvement. Moderate elevations with opportunities for fishing and shooting are to be recommended.

tion in the intestines, could be made to disappear when plenty of carbohydrate food was given (see F. Müller, in von Leyden's *Handbuch der Ernährungstherapie*, 1897, vol. i. p. 215).

The periodic headaches accompanying *dysmenorrhœa* require attention to this complaint. Imperfect circulation in the abdominal organs, frequently combined with constipation (see sections 20 and 65), is not rarely the cause of these headaches; hence Franzensbad and Kissingen are so often useful. Sometimes anæmia is a well-marked complication, and renders chalybeate waters advisable, either alone, or to follow the first-mentioned treatment.

Headache from dysmenorrhœa

The headache, which is often associated with chronic *asthma*, is probably due to imperfect aëration of the blood; it disappears mostly with the amelioration of the *asthma* (see Section 54 of this chapter).

Headache from asthma

Chronic bronchitis and dilatation of the heart are likewise in some persons attended with headache, which seems to be partly due to imperfect reflux of venous and imperfect supply of arterial blood; but defective oxidation and the retention of ptomaines have probably a share in it. We refer to the treatment mentioned under the heads of chronic bronchitis and dilated heart.

Headache from chronic bronchitis and dilatation of the heart

There is a kind of headache to which, for want of some better term, we will leave the label *neurotic headache*; it is sometimes one of the sequelæ of exhausting disease, sometimes caused by excessive mental work, chronic sleeplessness, shock, or worry. The trouble may be occasional at first but afterwards develop into an almost continuous chronic headache. Some individuals or families are more predisposed to it than others. Change is an important element in the treatment, at first to medium, later on to higher elevations; the first part of this treatment may advantageously be combined with the use of simple thermal waters. As Dr. S. Gee points out in speaking of chronic headaches (*St. Bartholomew's Hospital Journal*, June 1897), sufficient time must be allowed for the effect of change of climate and mode of life to show itself.

Neurotic headache

Sick headaches (Megrim, Migraine, or bilious head-

Megrim or sick headache

aches), for the pathology of which we may refer to the works of Dr. Edward Liveing and Professor P. W. Latham, vary considerably in different persons, and even in the same person at different times. Balneo-therapeutic treatment is on the whole disappointing. If there is likewise habitual constipation, benefit is sometimes derived in persons of full habit from the sulphated alkaline and sulphated waters (Chapters X. and XI.), and in lean persons from the muriated waters (Chapter VII.). We can never give a promise in such cases; but occasionally patients find great improvement for many months and even years. Persons liable to sick headaches must limit the amount of food, take very little butcher's meat and much open air exercise. Mountainous climates of moderate elevation (Chapter XVIII., Group II.) are in general best suited to this class of cases.

Tic douloureux and facial neuralgia

47. *Facial Neuralgia and Tic douloureux.*—Ordinary treatment, combined with change of air, is generally more applicable than balneo-therapeutic treatment. There are, however, cases in which anæmia is the predisposing cause, and in which the spa treatment, beneficial in anæmia, deserves a trial. In other cases a malarious taint is present, especially in neuralgia of the supraorbital division of the trigeminal ('brow-ague'), in which cases chalybeate spas, and arsenical spas, and long residence in dry localities of high altitude are generally useful. In other cases rheumatism appears to be the cause, and the simple thermal waters (Chapter VI.), occasionally also the iron waters, may be tried. When gout is associated with facial neuralgia, it may require the principal attention (see Section 14). The severest and most typical forms of 'tic douloureux' are not likely to yield to balneo-therapeutic treatment, and indeed they seem to yield permanently to no, not even surgical, treatment.

Clavus hystericus is not a true neuralgia, and we must refer to what is said in the paragraph on hysteria (Section 50) for spa treatment in clavus and 'hysterical neuralgias.'

48. There are many other neuralgias for which invalids often desire spa treatment. The most frequent are perhaps: *Intercostal neuralgia*, *occipito-cervical*, *cervico-brachial*, *crural*, and *lumbo-abdominal* neuralgia. Some of these so-called neuralgias are in reality due to neuritis. The balneo-therapeutic indications are rather similar to those just mentioned (Section 47). Local treatment by hot or alternate douches and massage is often serviceable, especially in chronic cases. We may refer also to what has been said on sciatica (Section 11). Amongst the neuralgias of internal organs *gastralgia* and *cardialgia*, though they are occasionally, apparently at least, primary, are frequently due to dyspepsia, and we may refer to the paragraphs on that disorder (Section 18 of this chapter). Other neuralgias

49. *Disorders of sleep* are numerous and of different nature. They often tax the attention of the physician to a great degree, and require his intimate knowledge of the habits of the sufferer, and of the peculiarities of his nervous, circulatory, and digestive systems. They belong more to the sphere of home treatment; but often when this fails, climatic and spa treatment may render good service. We cannot enter into the many causes of disordered sleep, the removal of which often leads to a return to the natural condition; but there are cases connected with the state of the circulation, and others more directly with that of the nervous system, where the ordinary hygienic arrangements in the life at home fail, and where it is undesirable to employ the usual remedies to produce sleep. Disorders of sleep

We may roughly divide the disorders into two classes, viz., *defective* and *excessive* sleep.

(*a*) The very large class of cases of *defective sleep*, insomnia, includes many varieties, which we cannot fully discuss here. Some persons are unable to fall asleep, others wake a hundred times and oftener during one night, others have distressing dreams, others readily fall asleep, but awake after some hours, and cannot go to sleep Insomnia

afterwards, and are then worried by thoughts of anxious nature. Many of these cases come under the head of irritable weakness, and are greatly benefited by travelling, by change of air alone, by the use of simple thermal waters (Chapter VI.), notably at Schlangenbad and Plombières, by long residence at moderate elevations, especially in forest districts, with comparatively little movement of air. In some persons dilatation of the heart and defective circulation in the head are the cause, and in such cases, in addition to the means just mentioned, the use of the gaseous thermal muriated waters acts as a promoter of sleep. For the sleeplessness often accompanying asthmatic conditions, even independently of the attacks, we refer to Section 54. For sleeplessness due to dyspepsia and derangements of abdominal organs, we refer to the various sections dealing with these conditions. In cases where *anæmia* is the cause of sleeplessness, the treatment must be directed to that affection. Many scientific workers suffer from insufficient sleep after having continued to work assiduously for some months. The same is the case with many lecturers and professional men. Often this can be prevented by regular daily open-air exercise or by regular breaks in the work. Some sufferers of this class always regain sound sleep by courses of baths at indifferent thermal spas, others simply by residence at high elevations.

Excessive sleep

(*b*) *Excessive sleep* is often met with in so-called plethoric subjects, especially those with 'abdominal plethora' (Section 19), and in cases with a tendency to cerebral apoplexy. Such persons are apt to fall asleep, as soon as they are left alone, especially after meals, and sometimes, if they are allowed, sleep on for three or four hours at a time, in addition to nine or ten hours of heavy sleep at night. They fall asleep not only while reading, but also while writing a letter, or at the dinner table. These conditions of excessive sleep are usually less distressing to the invalid than those of defective

amount of sleep; but they are often more grave. They require, in addition to strict arrangement of food and exercise, the sulphated alkaline (Chapter X.), or, if occurring in lean persons, the muriated waters (Chapter VII.). After the course of waters the invalids should be sent for a month or longer to moderately elevated localities (Chapter XVIII. Group II.), where they can spend the greater part of the day in the open air, and should not be allowed to sleep more than seven hours in the twenty-four. The quantity of food and beverage must be restricted, and a large amount of open air exercise or Swedish gymnastics should be an essential part of their habitual regimen.

The amount of sleep which people require varies considerably, not only at different ages, but at the same age in different individuals. We do not speak here of childhood[1] and the time before adolescence, when much sleep is useful, but only of the periods of manhood and advanced age. Many persons require only five hours, and ought not to worry themselves if they obtain no more. Most people ought to be satisfied with six or seven hours; in only very few are eight necessary. But many exceed this limit, and by too much sleep diminish their metabolic changes and the excretion of waste products, thus inducing obesity and a comparatively early degeneration of blood-vessels, especially the veins and capillaries.[2]

Hysteria

50. *Hysteria*, though the term is faulty, is a real disorder of the nervous system. We do not apply the word to nerve disorders confined to women, and connected with the womb, but, to use the words of Dr. Buzzard in his instructive article in Quain's Dictionary of Medicine, 'to a condition of the nervous system fairly defined, but the intimate pathology of which is not known, characterised by the occurrence of convulsive seizures and by departures from normal functions of various organs, leading to very numerous and often perplexing symptoms.

[1] Though even in children sleep may be excessive, the proper development of the higher parts of the brain being thereby hindered.

[2] H. Weber, *Zeitschr. für Diät.* Leipzig, 1898, vol. i., p. 20.

These are apt to simulate those commonly arising from definite alterations in structure, but differ from the latter in the fact, that they may often, even when at their worst, be removed instantaneously, usually under the influence of strong emotion.' Want of will and want of inhibitory power are further prominent symptoms. Spa treatment has no special curative influences, but occasionally can ameliorate concomitant conditions such as dyspepsia, constipation, anæmia (see under these headings). The irritable weakness of the nervous system is often favourably influenced at the simple thermal spas (Chapter VI.), amongst which Schlangenbad and Plombières have obtained a special reputation. The change in surroundings, the intercourse with strangers, inducing mental restraint, the authoritative influence of a new doctor are helpful agents. The regular employment of the day by the drinking of waters and bathing, by the *table d'hôte* meals, by the promenade, and by listening to the music, is a most important element in the spa treatment of many cases of this class. In our experience the improvement was often only transitory, but extended in some instances over many months and years, and was permanent in two long-standing cases, but this was to be ascribed to judicious surroundings, and to the happy influence of successful occupation. Functional nervous troubles in rather torpid individuals, without irritability, may often be benefited by stimulating sea-side localities, combined or not with the judicious use of sea bathing.

Hypochondriasis

51. *Hypochondriasis*, though the term is justified by old usage, is likewise a defective name, for the disease is of course not in the hypochondriac viscera, but in the central nervous system. In many cases where no abnormality in the physical state and in the condition of the organs can be discovered, very little can be done by spa treatment, excepting in so far as it supplies a source of occupation. Travelling under favourable circumstances (*i.e.* with judicious friends), and more or less absorbing occupation, are, indeed, by far the best means

of treatment. The cases of hypochondriasis combined with physical disorders, hypochondriasis with a pathological 'substratum,' offer more scope for treatment, and permit on the whole a more favourable prognosis. Constipation, hæmorrhoids, dyspepsia, and gouty complications, are to be treated in the way discussed under these headings. Severe courses, however, must be avoided, for the general health of hypochondriacs is easily lowered, but not so easily raised up again. Syphilis may sometimes be present, but it has nothing to do with the disease itself, although some hypochondriacs are incessantly haunted by the idea that they are syphilitic, and demand antisyphilitic treatment, which is mostly much worse than useless.

Neurasthenia

52. *Neurasthenia*, sometimes called 'Beard's disease,' is a term which is often misused, but it expresses much of the condition present in the class of cases so well described and treated by Dr. Weir-Mitchell and Dr. William Playfair.

Spa treatment in itself is entirely useless, but it is sometimes possible to adopt management and treatment during a stay at a spa, which in ordinary home-life is not easily carried out. Weir-Mitchell has shown us that removal from home surroundings is almost indispensable. The two other elements of his treatment, forced feeding and massage, are likewise very important, but not always to the same degree. We have seen occasionally satisfactory results, for instance at Schlangenbad, where the removal from home influence, the authoritative advice with regard to food and exercise and baths, did what isolation and rest in a confined house in town, with massage and forced feeding, did not do. Much depends on the degree of the disease; in slight cases spa treatment is sometimes very useful, in severe cases it is useless.

There are many relapses, but some invalids are entirely cured. One of the first cases on which Dr. Weir-Mitchell tried his treatment was a lady who had

been attended by us, but who remained thin and weak and unfit for the daily demands of life. She was entirely cured by Dr. Weir-Mitchell, and now judiciously superintends the employment of her large fortune for philanthropic purposes.

Exophthalmic goitre

53. *Exophthalmic goitre* (Graves' disease or Basedow's disease), though the thyroid-intoxication and even the infection theories may be partially true, and though the primary ætiological factors may not always be the same in different cases, must be considered a disease in which the nervous system is always affected, whether the nervous affection is the primary one or not. The soothing simple thermal (Chapter VI.), and the gaseous muriated baths often give beneficial results in the milder and chronic cases; and when the disease is complicated with anæmia, the chalybeate waters may be useful. The removal from the excitement and worry of home life is helpful in this treatment. Climatic influences are sometimes important, and residence in elevated regions is mostly preferable. S. E. Solly ('Trans. Amer. Climatological Ass.,' 1897, Vol. XIII., p. 245) thinks, however, that any undue exertion is more likely to have an unfavourable effect on patients with Graves' disease at high altitudes than at low ones. We may say that we have in several cases seen arrest, even amounting to cure, from migration to or prolonged stay in elevated regions (Chapter XVIII. Groups I. and II.). The acute and severest cases are, of course, unsuitable to spa or climatic treatment, at least, until the active progress of the disease has become somewhat arrested. For such cases prolonged perfect rest and quiet are indispensable.

W. Winternitz (see *Blätter für klinische Hydrotherapie*, April, 1897, p. 65) has recently recommended the employment in this disease of careful hydrotherapeutic measures, with massage, Swedish gymnastics and diet, only according to individual indications.

Goitre

Ordinary *goitres* are mentioned in this place merely for convenience. All that need be said on the climatic

treatment is that patients so afflicted should reside in a locality where goitre is not endemic, and where they can obtain good drinking water.

Spasmodic asthma

54. *Asthma* pure and simple, or true asthma, is a nervous affection; it may be regarded as a neurosis manifested in branches of the pneumogastric nerve.

In the management of pure 'spasmodic' asthma mineral waters are of secondary importance, while climate takes a much greater share. Arsenical waters and sulphur waters are often used, and especially those of Mont Dore, La Bourboule, and the Pyrenean spas; but it is not certain whether the benefit frequently derived is not due rather to the elevated situation of the spas than to their waters; for although one can never say, before a trial has been made, which climate will suit an asthmatic person, experience is in favour of elevated regions, especially those with little wind, such as Davos and Arosa; and the younger the individual is, the more likely is he to obtain benefit from long residence in elevated sunny regions, especially in winter, but also in summer. If, however, asthma is combined with advanced emphysema, very high elevations are not to be recommended, but moderate elevations in sunny positions with some shelter from winds, such as Grasse, near Cannes, and places even as elevated as Glion and Les Avants, above Montreux, offer good chances.

In *asthma associated with chronic bronchial catarrh*, the recommendations given under the latter heading hold good, and here again Mont Dore has established for itself a great reputation. In persons, however, with marked dilatation of the heart, in advanced emphysema, and in old people, we have repeatedly seen unsatisfactory results from treatment there, while muriated alkaline (Ems, and Royat, and Gleichenberg) and sulphur waters in lower situations have been more useful, and also the gaseous thermal muriated waters (Nauheim). We have also seen marked benefit in several cases from a course of treatment at Weissenburg in Switzerland, and were

inclined to ascribe the good result, not so much to the waters, as to the peculiarly sheltered position of the place in a hollow surrounded by high rocks and fir trees, and its moderate elevation above sea-level.

In *asthma complicated with gout*, the latter affection must be taken into consideration; and in asthma connected with affections of the skin or of the abdominal viscera, treatment of these occasionally cures the asthma.

Hay asthma. Hay fever

Hay asthma and *hay fever* are generally used synonymously for an affection, occurring only in specially predisposed individuals, of which the exciting cause is the action of the pollen of plants (especially that arising from hay fields) upon the nasal mucous membrane. The asthmatic form, like the more ordinary coryza form, of hay fever is best prevented by avoiding the exciting cause, *i.e.* by avoiding the proximity to hay fields. In some of the worst cases of hay fever a sea-voyage may be recommended during the hay season, but often a change to mountain resorts answers equally well. The good effect of high open situations in preventing hay fever is probably partly due to a bracing effect on the constitution, rendering the nasal mucous membrane and its nerves less susceptible to irritation, but in some of these instances the absence of hay fields in the immediate neighbourhood may account for the good effects observed. When the hay fever is associated with asthmatic symptoms, the good effect of high elevations may be compared to the beneficial effect of mountain health resorts, as already mentioned, in cases of spasmodic asthma. Spa-treatment in hay fever is by itself not likely to give special benefit, but some spas at higher elevations and portions of some marine spas are well removed from hay fields, and may be used for residence during the trying season.

Diabetes insipidus

55. *Diabetes insipidus* is mostly dependent on the nervous system, and is sometimes an early symptom of gummata or various pathological changes in the nerve

centres ; in other cases it is only functional. Chalybeate waters, simple thermal waters at high elevations, and long residence in alpine regions, are mostly useful. We do not apply the term either to the transitory attacks of frequent micturition from temporary nerve influences, or to that form of polyuria connected with disease of the kidneys.

Affections of the Eyes.

56. There are no waters which have any specific action in eye diseases, but the constitutional conditions with which they are associated or on which they depend, are often more or less amenable to treatment by mineral waters and climate. Thus, in chronic catarrh of the conjunctiva, blepharitis, &c., when occurring in scrofulous individuals, muriated springs are useful, such as Woodhall Spa, Reichenhall, Oeynhausen, Nauheim, Kreuznach, Hall in Upper Austria, Bourbonne-les-Bains, Salies-de-Béarn, and the arsenical waters of La Bourboule ; when depending on anæmia, chalybeate waters are indicated ; and when there is obstinate constipation, the waters of Karlsbad, Franzensbad, Brides-Salins, &c., may be tried, or for home use one of the various bitter waters (Chapter XI.) may be employed. For the after-cure woody localities should be selected, free from dust, high winds and the glare of the sun. Owing to the glare sea voyages and residence at the sea-side should not be advised.

Cutaneous Affections.

57. Skin diseases were formerly very generally treated at spas, but the benefit to be obtained from balneotherapeutic treatment is very moderate. We may refer to a short judicious survey of the subject by Dr. Robert Liveing in Quain's 'Dictionary of Medicine' (2nd edition).

In eczema and various cutaneous eruptions one endeavours to ascertain whether the cause of the skin affection lies chiefly in the skin itself and depends on an inherent predisposition, some temporary irritation acting usually as an exciting cause, or whether the skin complaint is rather due to a disorder of internal organs, which causes an alteration in the quality of the blood supplied to the skin. The skin probably in some cases endeavours like other excretory organs to get rid of

noxious materials in the blood (both those introduced into the body from without, as drugs and food, and those resulting from disordered metabolism of the tissues, and the action of microbes in the body), and like the kidney, &c., is liable to suffer [1] in the performance of this duty, though doubtless more so in some individuals than in others. Many skin affections are due partly to local tendencies, partly to alterations in the quality of the blood, and also partly to local irritation of various kinds. The influence also of the nervous system undoubtedly plays often a great part, sometimes even the chief part in the causation.

When the skin affection depends chiefly on disorders of internal organs, the derangements of these organs must of course be treated, and in chronic cases spa-treatment and climates will often be found useful.

When the skin itself, and the function of the nervous system, are chiefly at fault, climates and spas may likewise be useful. Tonic dry inland climates of considerable elevation (Chapter XVIII. Groups I. and II.) often suit, but in other cases, especially in nervous and excitable subjects, lower elevations (Chapter XVIII. Group III.) are to be preferred, and sometimes equable, fairly moist, seaside localities (Chapter XVII.). Ordinary thermal baths, prolonged tepid baths (as at Loèche-les-Bains), and various hydrotherapeutic processes may be of use by promoting the circulation in the small cutaneous blood-vessels and so aiding the nutrition of the skin, and, as we have already mentioned (see Chapters III. and VI.) in reference to prolonged baths, by macerating the thickened epidermis, washing off scales and discharges in psoriasis and eczema, and exercising a soothing or tonic effect upon the nerve endings in the skin. Needless to say, in selecting climates for persons peculiarly liable to cutaneous affections, the effects in each case of heat, bright sunlight, glare, strong winds and cold weather

[1] Dr. David Walsh makes most suggestive observations on this subject in his little work on *Excretory Irritation* (London, 1897).

must be subjects of special consideration. Against cold, however, suitable clothing will often suffice, and Dr. R. L. Bowles has shown that the injurious effects of glare may sometimes be obviated by the use of grease-paints, orange-coloured veils, &c.

Acne

Acne is sometimes complicated with anæmia, and in such cases the balneo-therapeutic treatment of the latter is applicable, though it rarely cures the acne, and the ordinary home treatment, too, is often powerless. The affection almost always disappears later on spontaneously. Mental irritation and other injurious nervous influences must be avoided in acne as in acne rosacea.

Acne rosacea or *gutta rosea* offers no great scope to spa-treatment, excepting that complications, such as dyspepsia and constipation, may be treated by mineral waters, and that the removal of these complications often checks the skin affection. Alcoholic beverages are to be avoided or used with the greatest restriction.

Eczema. Eczema seborrhœicum

Eczema is of all skin diseases the one for which the sufferers most frequently demand balneo-therapeutic treatment, but local pharmaceutical remedies give generally greater relief, especially when the eczema is distinctly localised, and in cases of seborrhœic eczema. If there is any distinct gouty complication, or constipation, or glycosuria, we may refer to what has been said under those headings. Schinznach, Uriage, and Saint-Sauveur have acquired a certain reputation, and in individuals belonging to gouty families, Royat and La Bourboule. The simple thermal waters, likewise, prove sometimes useful. In very torpid, chronic cases, which in their appearance resemble psoriasis, Loèche-les-Bains exercises very good effects, but these are often only temporary. No certain promise can be given, and the spa physician must proceed cautiously. The mere change of climate often exercises a beneficial effect in this as in other chronic affections. Cold combined with damp and high winds is mostly injurious. Sea-air aggravates eczema in many patients, at all events in the beginning, though frequently acclimatisation afterwards

takes place. As to altitude, Mr. Malcolm Morris (*Brit. Med. Journ.*, 1894, Vol. II. p. 647) is justified in saying that idiosyncrasy has to be taken into consideration.

Urticaria

The tendency to repeated attacks of urticaria is occasionally very obstinate, and is in many instances as little influenced by spa-treatment as by ordinary treatment. There are instances in which a gouty disposition is connected with urticaria, and in which alkaline (Chapter VIII.) and alkaline muriated waters (Chapter IX.) do good; in other cases sulphur waters, such as those of Schinznach and Uriage, are useful. In a considerable number of cases urticaria has a distinctly *neurotic* element in its nature; thus we have seen persons in whom it alternates with attacks of asthma, or with attacks of palpitation of the heart, and again others where mental emotion is apt to bring on an attack. In this neurotic class change of locality and surroundings and escape from worry are important; at the same time simple thermal waters (Chapter VI.) and the arsenic waters of La Bourboule are useful. According to Professor A. E. Wright, of Netley, some cases of urticaria are associated with deficient blood coagulability, and might be treated with calcium chloride, which increases the coagulability of the blood (*Lancet*, January 18, 1896). In such cases a purified and diluted 'Mutterlauge,' rich, like that of Kreuznach, in calcium chloride, might possibly be taken with advantage, if Professor Wright's views are correct; the salt-water baths, if not too irritating to the skin, would exercise a beneficial influence on any associated scrofulous or rickety tendency.

Purpura

Purpura.—What has just been said regarding chloride of calcium would apply equally to certain chronic purpuric eruptions, and to children with a hæmophilic tendency.

Lichen

Lichen.—Much of what was formerly called lichen is now classed with eczema. In chronic cases of lichen ruber or lichen planus there is often a certain degree

of anæmia, and chalybeate or arsenical waters may be useful.

Psoriasis is as intractable to balneo-therapeutic as to ordinary means of treatment. The waters mentioned under the heading 'Eczema' are often attended with more or less transitory relief. The long-continued immersions in the warm waters of Loèche-les-Bains (Leukerbad) have, up to this time, led to better results than the treatment at other spas. The bathing in these waters during four to six hours every day produces after some time a superficial cutaneous inflammation, which is mostly followed by complete disappearance of the scaly eruption, but the recurrence of the disease after some months is rather the rule than the exception. Psoriasis

Prurigo, i.e. Hebra's prurigo, not pruritus, may be regarded as very intractable. Loèche-les-Bains claims some successes, but, as far as our limited experience in this comparatively rare disease goes, they are not permanent. Climates may be of use, if they are capable of inducing an improved condition of the general nutrition of the patients. Prurigo

Pruritus, when independent of skin eruptions and external irritation, is mostly caused by disorder of internal organs, or a gouty condition. Derangement of the liver, especially in its secretion of bile (partly an excretion), is a frequent cause. Karlsbad and Vichy are useful in this variety. In gouty cases a course of thermal baths, douches, or other spa-treatment, acting specially on the deranged metabolism, may be tried. In some neurasthenic subjects thermal spas and a change of climate may be useful. In women *pruritis genitalium* is in most cases connected with pelvic affections, local discharges, skin eruptions, or glycosuria, and ought in these cases to be treated accordingly. For *pruritus ani*, spa treatment alone is useless, unless it be associated with constipation or hæmorrhoids, in which cases the treatment applicable to those conditions is occasionally curative. A restricted and not very stimulating diet is often necessary. Pruritus

Pruritus senilis (sometimes called 'prurigo senilis'), especially when it occurs in gouty and nervous persons, is often benefited by Schlangenbad, Plombières, and other simple thermal spas (Chapter VI.), also by sulphur waters such as those of Schinznach and the Pyrenean spas, and by passing the winters in warm and dry climates with open-air life.

According to Dr. T. D. Savill (*Lancet*, 1896, Vol. II. p. 300) various kinds of pruritus are sometimes benefited by calcium chloride. In such cases the internal use of a purified and diluted 'Mutterlauge,' rich in calcium chloride, might be of use.

Seborrhœa

Seborrhœa sicca capitis, or *pityriasis capitis*, in young and old is much more suitable for ordinary than for balneo-therapeutic treatment.

Pityriasis rubra

Pityriasis rubra in its typical severer forms is doubtless unsuitable for balneo-therapeutic treatment. The simple thermal waters (Chapter VI.) answer to some degree in milder cases connected with much irritation. In very chronic cases without much irritation the sulphur waters (Chapter XIV.) are sometimes useful, especially those of Uriage. Ordinary home treatment ought, however, to be tried first.

Epiphytic skin affections

The different kinds of *epiphytic* skin affections, such as *tinea trichophytina* (ringworm, or tinea tonsurans) and *tinea versicolor* (pityriasis versicolor), are better treated by ordinary means.

Boils

Chronic furunculosis

Furuncles or *boils* mostly yield to local and general home treatment, but in very obstinate cases a climatic change is useful, and both seaside and mountain air can be recommended. In some anæmic cases the change is advantageously combined with the use of chalybeate or arsenical waters (Chapters XII. and XIII.), especially at St. Moritz and Ceresole Reale; or of the muriated alkaline arsenical waters of La Bourboule. Sulphur waters, too, have been found useful, especially the muriated sulphur waters of Harrogate and Llandrindod

in England, and Uriage in France, and the strong sulphuretted hydrogen waters of Lenk in Switzerland. In most cases the influence of the climate of the spa and the change in regimen and occupation play at least as important a part in the good result as the mineral waters employed. For cases of furunculosis associated with glycosuria or albuminuria we will refer to the sections on Diabetes and Urinary affections.

Lupus

In cases of *lupus* the predisposing state of the body can to some extent be treated by spas and climates. In this way strumous and cachectic conditions may be remedied (see under these headings). Cold, windy, and damp places are unsuitable, and in the winter months a warmer, drier and brighter climate may be sought. Cold winds and an extremely hot glare are both to be avoided in *lupus erythematosus*.

Syphilitic skin diseases

In *syphilitic skin diseases* the treatment of syphilis is the main point, not the skin. Balneo-therapeutic treatment can often aid the ordinary treatment, but we need scarcely enlarge on what we have already said under the head of 'Syphilis' (Section 5).

Skin weakness

Weakness of the skin is a condition to which in general not much attention is paid, but which is, nevertheless, very important. The skin is poorly nourished, is apt to perspire profusely, and atmospheric changes acting on the skin often cause rheumatic conditions, or catarrhal affections of the mucous membranes, bronchitis, diarrhœa, or abdominal or facial neuralgia, according to the individual tendency. This state of the skin belongs in many instances to the sequelæ of acute diseases, but in others it is part of a generally weak constitution. In very delicate persons the gaseous thermal muriated baths of Oeynhausen and Nauheim are preferable to stronger measures; in other cases hydrotherapeutic treatment, adapted to the power of the constitution, may be used, and in stronger persons sea baths may be employed. Prolonged change of climate and open-air life are most useful, and well-arranged sea voyages exert, in the

case of 'good sailors,' a most beneficial influence. Amongst inland health resorts those of high elevation (Chapter XVIII. Group I.) are preferable to those with lower situations; and this holds good with regard to winter as well as to summer resorts.

Diseases of the Urinary Organs.

These come only to a slight degree under spa treatment.

Disease of the kidney. Bright's disease

58. The various forms of nephritis require treatment by ordinary means much more than by balneotherapeutics; the vapour bath and the hot-air bath, and ordinary hydrotherapeutic means (the hot bath and the pack) are in these affections used in hospital and home treatment, combined with other means. Cases of advanced renal disease of any kind are unsuitable for spa treatment. When chronic albuminuria leads to anæmia, iron waters may, however, act beneficially, associated with residence in warm dry climates. In the early stages of chronic interstitial nephritis, occurring in gouty subjects, benefit may be derived from the spa treatment suggested for gout (Section 14).

In cases of renal disease either alone, or occurring as a complication with other diseases, such as phthisis and gout, climates of high elevation are not to be recommended, but warm, dry and sunny regions of slight to moderate elevations (Chapter XVIII. Groups II. and III.) are suitable in summer, and dry, warm, and sheltered seaside places (Chapter XVII.) in winter, or Egypt or Algiers. Milk is one of the most useful articles of food in these cases, and *milk cures* (Chapter XIX.) are suitable in some; koumiss and similar milk derivatives are at times preferable to ordinary milk.

Functional albuminuria, &c.

In the *lesser and temporary forms of albuminuria* (including the so-called phosphaturic albuminuria and dyspeptic albuminuria, described by A. Robin) which depend on nervous or digestive disturbance or on a vice

of the general nutrition (sometimes a kind of auto-intoxication) rather than on any organic disease of the kidneys, spa and climatic treatment may be of use, according to individual indications, combined with an appropriate arrangement of diet and regimen. In such cases, where there is evidence of mental overwork and worry, a rest or change of occupation is of prime importance in the treatment. Accompanying digestive and hepatic disorders must be considered in deciding on the kind of spa-treatment to be followed. Abdominal or general massage or special exercises may likewise sometimes be indicated.

The so-called physiological or *cyclical albuminuria* of young persons is not an indication for balneo-therapeutic treatment, but as occurring especially in gouty families, rather for a general regimen in which the ordinary predisposing causes of gout and gravel are as far as possible avoided.

For *congestion* of the kidneys from dilatation of the heart the treatment suggested under that heading (Section 35) may be referred to.

Lardaceous disease

Lardaceous or amyloid disease of the kidneys, in slight degree, may accompany any chronic nephritis, but practically all pronounced cases depend on chronic suppuration in some part of the body or on constitutional syphilis. The treatment is essentially that for the cause of the affection, but as in other renal cases, mild winter climates may be useful. When it occurs in scrofulous children marine or sunny mountain health resorts are likely to be useful, if the general condition of the patient be not too feeble.

Paroxysmal hæmoglobinuria

59. *Paroxysmal hæmoglobinuria* is not strictly an affection of the kidneys, nor is it suitable to balneo-therapeutic treatment, but rather to climatic influences; residence in warm non-malarious localities giving good results (Chapter XVII. and Chapter XVIII. Group III.).

60. *Renal calculi*, of uric acid or oxalates, or of both,

Urinary calculi

are occasionally passed during Karlsbad treatment, with or without the occurrence of renal colic. More frequently the tendency to fresh formation is checked by this treatment or by the alkaline waters of Vichy and Vals in France and Vidago in Portugal. Contrexéville and Wildungen, the principal types of the earthy waters, are not rarely useful if they can be taken in large quantities —by an action which may be termed flushing out the kidneys. Often, however, the intended result is not obtained, either by these or by Karlsbad waters. As a preventive to calculous formation in the uric acid diathesis, the dietetic use of the water of Luhatschowitz (*q.v.*), in doses of two or three tumblerfuls during the twenty-four hours, is often effective, and the risk of rendering the urine too alkaline, and thus favouring the deposition of phosphates, is avoided. The latter danger exists in the too long use of simple alkaline waters, though there are some people who can take for years a bottle of Vichy or Vals every day with advantage, and without their urine becoming alkaline. In plethoric persons a dose of 'bitter' or sulphated waters (Chapter XI.), twice or three times a week, is mostly beneficial, in addition to the regular drinking of a tumblerful of hot water night and morning, or of one of the slightly alkaline table-waters (Chapter XVI.).

Stone in the bladder requires surgical treatment, and this is also sometimes the case with calculus in the kidney, pelvis of the kidney, or ureter.

Pyelitis

61. *Chronic catarrh of the pelvis of the kidney* (chronic pyelitis), when not due to tubercle or an actual calculus, is, with proper diet and limitation of exercise, sometimes benefited by similar treatment to that recommended in Section 60; but the condition of the urine must be constantly watched. If the urine is apt to become alkaline, neither Karlsbad nor Vichy nor Vidago is permitted, though the waters of Contrexéville and Wildungen may often be used with advantage. Milk cures (Chapter XIX.) and modified milk cures are sometimes useful.

The same may be said with regard to *chronic catarrh of the urinary bladder*. The arrangement of diet in all these troubles (Sections 58, 60, 61 and 62) is a most important duty. Meat and stimulants ought to be limited as much as possible. The skin ought to be carefully attended to, and the hints about climate given under Section 58 ought to be carried out as far as is practicable for the individual case. Vesical catarrh

62. The cause of *nocturnal incontinence of urine* in children and young adults is not always the same, and this troublesome infirmity usually after some time disappears without special treatment. A satisfactory result is often obtained by the most different methods. A tonic course of treatment by chalybeate waters, marine baths, or hydrotherapeutics, is occasionally successful. When the disorder is partly due to an abnormal or irritating quality of the urine, mineral waters like Contrexéville (as recommended by Debout-d'Estrées [1] and Cruise [2]) may be of use. Nocturnal Enuresis

Diseases and Disorders of the Sexual System.

(*a*) In *men* there are few affections of this class which are amenable to balneo-therapeutic treatment. Sexual system in men

63. The diseases of the *testes* and the *prostate* belong much more to the sphere of ordinary medical and surgical treatment, and only associated derangements of health ought to come under spa treatment, and these ought to be attended to according to the suggestions already made under the proper headings.

A few words, however, may be devoted to affections of the *generative function*, for which advice is often demanded, and which are mostly connected with diminished sexual power, or more or less complete *impotency*. Frequently it happens that the want of power for which

[1] 'Traitement de l'Incontinence essentielle d'Urine, chez les Enfants, par l'eau de Contrexéville.' *Académie de Méd.*, Paris, 1880.

[2] *Notes on Contrexéville*, Second edition, 1896.

advice is asked is due to worn-out organs, either from general old age, or old age of the sexual organs. It is sometimes difficult to convince a man who is only fifty or sixty, or even less, that the power has ceased from premature old age, and that there are great differences in different men with regard to the period of life when these functions cease. It is useless to send such men to spas. Very often, however, the functions have not entirely ceased, and can be rendered again more active by strengthening waters and climate, and, above all things, by giving a long rest to the organs. In such cases of only partial or transitory impotency iron waters (Chapter XII.) and simple thermal waters (Chapter VI.) at high elevations have acquired a certain reputation, especially amongst the former, St. Moritz, amongst the latter, Gastein. Sea air and sea baths are likewise often useful. These remarks are often applicable to the cases of impotency from excess of sexual intercourse or from masturbation.

The temporary impotency caused by acute febrile diseases, such as severe enteric fever, is cured by 'time,' though the sexual power often does not return for many months or even years. Tonic treatment by the ordinary remedies, by waters, and climatic resorts, especially those at high elevations (Chapter XVIII. Group I.), is likely to be useful.

Bodily and mental breakdown from over-exertion and anxiety is likewise not rarely the cause of impotency, and the management in such cases is somewhat similar.

There are other cases in which virility is diminished or for a time entirely kept in abeyance by various morbid conditions; for instance, by dyspepsia with phosphaturia, by hypochondriasis, by glycosuria, albuminuria, gout, dilatation of the heart, shock. In such cases the different causal conditions are to be treated either by ordinary means or by the spa or climatic treatment recommended under the respective headings, and if the cause be remedied the power will mostly return.

It is not necessary for us to discuss *sterility* in the male (aspermatism and azoöspermatism), for spa treatment can offer no cure.

(*b*) *Disorders of the Sexual System in Women.*

64. *Disorders of menstruation.*—Of *amenorrhœa* only the varieties due to the general state of health can come under consideration for spa treatment; it is absolutely unnecessary to refer to cases due to imperfect local development. If the amenorrhœa is due to imperfect general development or to anæmia, one may, in addition to management of diet and regimen, recommend iron waters, long residence at the seaside with or without sea bathing, according to circumstances, or mountain climates; but if dyspepsia and constipation are likewise present, the muriated waters or the gaseous thermal muriated waters are likely to be beneficial. Time and patience are required, no over-treatment and no local interference should be permitted. If amenorrhœa is due to passive congestion of the womb, treatment similar to that for amenorrhœa from constipation may be recommended. Menstruation may be too scanty, or it may occur only at long intervals, and similar considerations to those just mentioned ought to guide the treatment. In cases combined with great torpor of the intestines and intestinal circulation, the waters of Franzensbad, combined with the moor baths of that place, are often very useful. In middle-aged women with amenorrhœa, combined with stoutness and sometimes with a rheumatic tendency, treatment at Franzensbad, Elster, or Marienbad is mostly of service. Amenorrhœa

In the management of deviations of the menstrual functions we have always to bear in mind that there are great natural varieties in different persons, varieties which are parts of individual habits and are within the limits of health, and these do not require interference

any more by spa treatment than by ordinary treatment.

It is probable that many cases of amenorrhœa and dysmenorrhœa would be avoided if greater care of the physical development of growing girls were taken, avoiding overwork, and providing regulated gymnastics and sufficient open air exercises and games; these latter (including walking, cycling, riding, swimming, rowing, lawn tennis, climbing, &c.) can be judiciously employed in the treatment of some menstrual disorders with or without associated balneo-therapeutic or other treatment.

Dysmenorrhœa

65. In *dysmenorrhœa* some forms, such as mechanical or obstructive dysmenorrhœa, must be entirely excluded from consideration in this place. In the *congestive* form, with enlarged uterus, often due to imperfect involution after confinement or abortion, the muriated waters (Chapter VII.) have obtained great reputation, and in some cases the muriated alkaline waters (Chapter IX.) have been found beneficial, but treatment in these cases ought not to be hurried; the usual course of three to four weeks is mostly insufficient, eight to ten weeks are often necessary, and a long stay at moderate elevations or at the seaside ought to follow. If the benefit obtained by a course of four to six weeks is encouraging, but not sufficient, it will frequently be found useful to interrupt the spa treatment by a month spent at some not too distant climatic health resort of moderate elevation, in Switzerland or the Black Forest, and to resume it afterwards. The uterus absolutely requires a long rest.

In *ovarian dysmenorrhœa*, which is still more intractable, as an alternative to the means just mentioned, a long use of the simple thermal waters may be suggested. In very chronic cases of both forms (congestive and ovarian) the moor baths at Franzensbad or Elster often prove beneficial, as also the internal use of the Franzensbad or Elster springs.

Membranous dysmenorrhœa is perhaps the most

obstinate form of dysmenorrhœa, but prolonged courses of treatment at the muriated alkaline and muriated spas, amongst which Ems and Baden-Baden have gained most adherents, or at the simple thermal spas, may be recommended with some chance of success.

The *neuralgic form* is generally scarcely less obstinate. Here, too, the simple thermal spas may be recommended, and, if there is inactivity of bowels, Franzensbad or Elster.

Excessive menstruation. Menorrhagia

66. *Excessive menstruation* may have different causes, and generally requires different kinds of home treatment, but when this fails it is in many instances advisable to have recourse to spa treatment, and not rarely long courses of chalybeate waters (Chapter XII.), and often the waters and baths of Franzensbad prove beneficial. A long rest at health resorts of moderate elevation (Chapter XXI.) ought always to follow the courses of these waters. Dr. Septimus Sunderland ('Journ. of Baln.' January, 1898) speaks of temporary benefit from health resorts of high altitude, such as St. Moritz and Arosa. Amongst his cases was one of menorrhagia of puberty. Hydrotherapeutics or seabaths may be tried in some patients of this class.

The menorrhagia depending on uterine fibroids will be shortly discussed under the latter head (see Section 70 of this chapter).

Climacteric period

67. To the derangements of the general health, often connected with the *climacteric period*, we have already alluded when speaking of disorders of the general health (Section 16). The sexual involution and the cessation of the menstrual functions are associated in many women with disorders of the function of the stomach and bowels and of the portal circulation, and of different spheres of the nervous system. The use of mineral waters under such circumstances requires greater caution than at other periods of life, but much benefit is often obtained from courses at Marienbad or Franzensbad or Elster, when there is tendency to constipation and stoutness, and of the muriated waters

(Chapter VII.), especially those of Homburg, Kissingen, and Baden-Baden, in the case of lean individuals. Harrogate and Llandrindod are likewise often useful. A long stay at moderately elevated localities (Chapter XVIII. Group II. and Chapter XXI.), or at the seaside (Chapter XVII.), with rest from the social fatigues and worries of home life, is imperative in such cases. In delicate persons of neurotic tendency the simple thermal waters are preferable.

Leucorrhœa

68. *Leucorrhœa* includes many varieties, and may be the result of different morbid conditions, general and local. The simplest varieties are *vulvar* and *vaginal leucorrhœa*, both more or less of the nature of catarrhs. If these affections do not yield to ordinary home treatment, muriated alkaline waters, such as those of Ems, La Bourboule, Saint-Nectaire, &c. can often be used with benefit; if constipation is associated with them, the muriated waters (Chapter VII.) are preferable, and in anæmic complications recourse may be had to iron waters (Chapter XII.). Well-arranged hydrotherapeutic treatment is likewise often useful. Tonic climates ought, if possible, to follow the course of waters.

The *cervical*, and still more the *intra-uterine* and the *tubal* leucorrhœas, are much less adapted to balneotherapeutic treatment, excepting in so far as the treatment can remove abdominal congestion (muriated waters, and amongst the alkaline-sulphated, Franzensbad and Elster), or can do good by improving the condition of the blood (iron waters), or by allaying pain and hyperæsthesia (simple thermal and gaseous muriated thermal waters).

Diseases of the uterus and annexes

69. The majority of *diseases of the uterus* are not suitable to spa treatment. All acute conditions ought to be excluded, and not less so prolapse and other displacements, unless the latter are due to a slightly relaxed condition of the parts; in this latter case, in stout persons, the sulphated alkaline waters and moor baths of Franzensbad are sometimes attended with great

success; in anæmic persons the internal use of iron waters with gaseous chalybeate baths or the muriated waters. Many chronic affections of the uterus and annexes are, as Dr. T. M. Madden[1] insists, dependent upon, or associated with, some constitutional gouty or scrofulous taint. These, as well as anæmia and functional nervous affections when present, can often be most effectually combated by suitable mineral waters and spa treatment. In imperfect involution after confinements and abortions, in chronic endometritis, metritis, and the remains of perimetritis and pelvic cellulitis (parametritis and peri-parametritis) the cautious use of the muriated waters, such as Kreuznach, Woodhall Spa, Kissingen, Châtel-Guyon, Reichenhall, &c. and muriated alkaline waters, such as Ems, Royat, Saint-Nectaire, &c. with long rest of the affected parts, is frequently attended with benefit. Occasionally, after these classes of waters, the iron waters (Spa, Schwalbach, Pyrmont, &c.) are to be recommended for use as secondary courses.

Uterine fibroids

70. In fibroid tumours of the uterus, Kreuznach has enjoyed a great reputation. It is difficult to understand how muriated waters and baths can really exercise good effects on these tumours, but many unbiassed gynæcologists (amongst them the late Dr. Matthews Duncan) have assured us of great benefit again and again derived by their patients from this treatment, especially by diminution of the menorrhagia. Such experience must be accepted, and we are inclined to explain it by the improvement of the circulation in all the abdominal organs, including the uterus, and possibly some absorption of inflammatory products around the tumour. We have, however, never been informed of the complete disappearance of a fibroid tumour through spa treatment, previous to the entire cessation of menstruation.

71. *Tendency to miscarriage* is a subject for which

[1] *The Scalpel*, April, 1897.

Tendency to miscarriage

women not rarely wish to have balneo-therapeutic advice. If the tendency is connected with anæmia and general debility, the waters recommended under these heads prove sometimes useful, but the treatment must be continued for a long time, and the womb, too, must under all circumstances have time to recover completely, before another pregnancy is risked.

If the miscarriages are due to renal disease, courses of spa treatment can only in rare cases be of service, whilst diet and general management are sometimes more successful.

If valvular disease with dilatation of the heart is the cause, the treatment recommended for the latter (Section 35) may be tried. At all events we have met with two cases where, after repeated courses of such treatment, and two years' rest for the uterus, the fœtus was retained to the natural term.

Whenever there is a well-founded suspicion of syphilis, this ought to be attended to, and we have then to decide either for home treatment or for specific treatment in combination with spa treatment.

Hysteria

Hysteria is frequently associated with affections of the female sexual system. It has already been discussed under disorders of the nervous system (Section 50), to which it probably belongs.

Sterility

72. *Sterility* in women is only in some conditions amenable to spa treatment. If the *ovaries* or the Fallopian tubes are imperfect or much diseased, or if the uterus or vagina is absent, it is useless to try cures by waters. Most affections of the uterus, too, such as defective development or displacements, cannot be improved by spa treatment. The limited amount which can be done by balneo-therapeutics in the chronic states of congestion or inflammation of the uterus and its lining and covering membranes, has been already alluded to in Section 69. Some waters, as the muriated alkaline (Chapter IX.), may assist in the cure of leucorrhœa and in correcting the acidity of the secretion

by which the spermatozoa are destroyed; the cautious use of the vaginal douche may, in addition, improve the circulation and nutrition of the uterus. It is well known that Ems has in such cases acquired a great reputation.

In spite of these considerations, by which the direct balneo-therapeutic action is so much restricted, we must acknowledge that we have numerous instances before us, in which well-arranged and long-continued spa and climatic treatment has been followed by pregnancy, and that a first pregnancy was in due time followed by further pregnancies without, or occasionally with the further help of, balneo-therapeutic and climato-therapeutic treatment.

We have often been told that such results weaken or contradict our restrictions on the use of spa treatment in sterility, but a few further considerations may perhaps show that the good results mentioned, in some cases at least, allow other interpretations. We have seen such results follow the use of very different spas, such as Ems, Spa, Schwalbach, St. Moritz, Kissingen, Homburg, Franzensbad, Rippoldsau, Griesbach, Baden-Baden, Buxton, Plombières, St. Sauveur, Gastein, Wildbad, Ragatz. We have further seen them follow long seaside residence with and without sea bathing. Again, we have seen similar occurrences after long residence in the Alps, in the Black Forest, in the Pyrenees, in Egypt, and Algiers, without the use of any mineral waters, and also after long sea voyages.

We ought to add that, in almost all the cases alluded to, we had succeeded in inducing long separations of wife and husband, and it is to this circumstance that we are inclined to attribute much of the success. This interpretation, we may say, was shared by some of the physicians with whom we had consulted about the cases, and with whom we had later on discussed the results, especially the late Dr. Addison and Sir William Gull. The latter used to say that in the Middle Ages great

ladies who had no children, and wished to have an heir, were often sent with their female attendants, but without their husbands, to distant shrines to pray for fertility, and that their prayers were not rarely granted, viz., that some time after their return they became pregnant.

In comparing such records with the results obtained by spas and climatic treatment, we are inclined to look at the matter somewhat in the following way. By the journey to the holy shrines and by the spa and climatic treatment, the health of the ladies had been improved, and this improvement was greatly aided by the powerful element of hope; by the long separation from the husbands and absence of excitement the sexual organs had enjoyed rest; the vigour on the part of the husband had been likewise increased by abstinence, and thus the intercourse after the reunion became fruitful.

CHAPTER XXI

LOCALITIES FOR AN AFTER-CURE TO SPA-TREATMENT

The nature and situation of the climatic health resort to be selected for rest ('after-cure,' 'Nachkur') after the various courses of waters is not without importance; but it is difficult to lay down general rules, as every case must be considered according to its individual nature and the accompanying circumstances. Courses of the more active waters usually ought to be followed by a longer rest than courses of the less active waters; but in the patients themselves there are great differences, which must guide the medical man in deciding the length of the after-cure to be recommended, and the particular health resort to be selected. Some patients are so weak at the commencement of the treatment that even after a very slight course of waters a long rest is necessary, and the locality selected must not be too distant from the spa.

Localities of considerable elevation

Although the elevation of a place above sea-level is an important point, there are many other considerations almost equally so; for instance: whether a locality lies on the south or on the north side of a mountain range or on the top; whether it is sheltered from cold winds or exposed to them; whether the air is habitually still or agitated; whether the soil is dry or damp; whether there are forests in the immediate neighbourhood, and whether these consist of pines or deciduous trees; whether the water is pure and abundant, whether it is

hard or soft; whether the air is habitually clear or dull from clouds, or often misty; whether the air is free from dust, or exposed to the latter, owing to the neighbourhood of chalky roads; whether the air is aseptic, or is impure from the nearness of large towns, manufactories, or marshes. It is further in most cases necessary to consider, whether the accommodation is good and hygienic; whether the food supply and the cooking are satisfactory; what are the means of access, by rail or by a good carriage road, by a long or short drive, or whether only by a mule path; whether there is a variety of excursions in the neighbourhood, and whether they are practicable for carriages or only for mules or donkeys or only on foot; whether there is an opportunity for level walking, or whether all is up-hill or down-hill; also what is the nature of the society, whether the life is simple or the opposite; whether there is much or little social amusement, music, dancing, games; whether there is a good chance of boating, fishing or shooting. We need scarcely mention again, that it is most important to know whether good medical advice can be had.

Long as this list of considerations is, it might easily be further enlarged. The physician who prescribes health resorts for an after-cure ought to be acquainted with the nature of the locality recommended, if possible by personal visits and the reports of thoroughly judicious people.

There are, however, some points about which we cannot be always certain. Thus the hygienic arrangements may suddenly get out of order; an epidemic disease may be introduced; the cook, or manager, or head waiter may be changed; the financial means may be lacking, and a usually suitable place may become altogether unsatisfactory for a longer or shorter period.

If we have to deal with patients possessing a soundly acting heart and healthy blood-vessels, and who are free from any other serious organic disease, we need not

fear a somewhat long journey, and may recommend bracing localities of considerable elevation (from 3,500 to 7,000 feet) even in the absence of level walks. We must, however, bear in mind that there are certain persons who do not bear high elevations, who become excited, lose appetite and weight, become sleepless and breathless, at higher elevations. They are principally persons of a so-called nervous type. To such persons we must not recommend high elevations.

With the exception of this class of cases, almost all the localities mentioned in Chapter XVIII. Group I. are suitable as far as the climate *per se* goes. As however the mental condition is always extremely important, we shall do well in recommending to those who become unhappy without amusement localities where social entertainment can be had. The health resorts in the Upper Engadine not only possess good hotels visited by many interesting people, but also good carriage roads, allowing fine drives in several directions. The Engadine is in this respect unequalled by any other district in Europe. Good hotels and beautiful scenery and agreeable society are to be found also at some other high altitude resorts, in Tyrol or in Switzerland, but there is not quite the same facility of carriage drives. We may mention Sulden and Trafoi in the Ortler district; the Davos Valley and Arosa in the Grisons; the Belalp, the Eggischhorn, the Riffel Alp and Zermatt, Montana and Caux in Valais; Mürren and Gurnigel in the Bernese Oberland; Rigi-Scheideck, Rigi-Kaltbad and Rigi-First on the Rigi.

To those who are satisfied with either quieter hotels or less English society, most of the other health resorts mentioned in Group I. of Chapter XVIII. would be acceptable.

Localities of moderate elevation

If the patient's heart is dilated and feeble, high altitudes and the absence of level ground must be avoided, whilst moderate elevations (600 feet to 3,500 feet), with the opportunity of exercise on level or only gently rising

ground, are preferable to low situations and even to the seaside. Such are many of the health resorts mentioned in Chapter XVIII. Groups II. and III.; in the Black Forest: Badenweiler, Rippoldsau, Griesbach, Petersthal, Freudenstadt, Titisee, Wildbad, Herrenalb, and Teinach; in the Thuringian Forest: Friedrichroda, Tabarz, Liebenstein, Ruhla, Oberhof, Ilmenau, Elgersburg, &c.; in the Harz Mountains: Harzburg, Wernigerode, Ilsenburg, Gernrode, Alexisbad, Blankenburg, Ballenstedt, Clausthal, Andreasberg; in the Vosges Mountains: Hohwald, Gérardmer; in the Fichtelgebirge: Alexandersbad, Berneck; in the Taunus: Koenigstein, Schlangenbad, Schwalbach, and Homburg.

To the north of the Bavarian highlands are some agreeable localities for this class of cases, such as Starnberg and Tegernsee, on the lakes of these names; the Salzkammergut and neighbourhood contain many useful and charming places: Salzburg, Gmunden, Ischl, Aussee and Alt-Aussee, St. Wolfgang (on St. Wolfgang See), Hallstatt, Zell-am-See; the central and northern portions of Tyrol (with the adjoining border of Bavaria) are very rich in localities of this character, we mention only Innsbruck, the Achensee, Bruneck, Partenkirchen, Garmisch and Kainzenbad (the last three in Bavaria).

In Switzerland (and the neighbouring part of France) a number of places of moderate elevation can be used for an after-cure, though not all of them have sufficient level walks for patients with much cardiac weakness. Amongst them we may mention Grindelwald, St. Gervais (village), Chamonix, Argentière, Les Avants and Glion (above Montreux), Macolin or Magglingen (above Bienne), Engelberg, Bürgenstock, Axenstein, Axenfels, Seelisberg, Seewis, Thusis, Ragatz, Le Prese, and Heiden. The list might however be considerably extended.

In patients with dilated hearts the differences in the individual power are so great that in some an altitude above 1,200 feet is not well borne, while others feel

perfectly well at 3,000 feet or more. In thoroughly well-compensated mitral affections high elevations are often quite as well borne as when the heart is perfectly normal.

Localities for malarial cases

When cases of malarial origin have undergone spa treatment, this treatment should always be followed by a long stay at some locality perfectly free from malaria. Places of high elevation usually exercise a much better effect than localities at low elevations, especially those in close proximity to large glaciers, such as Montanvert, the Belalp, the Rieder-Furka, the Eggischhorn, Pontresina, and Arolla.

For chronic rheumatic cases and rheumatoid arthritis

Very important cases are those of chronic rheumatoid arthritis and chronic rheumatism. If the heart in these cases is sound, one rarely need be afraid of a high altitude, though in many of them lower elevations are more satisfactory, but it is essential to select dry and sunny localities. Such localities are: Les Avants, Glion, and Caux above Montreux; St. Beatenberg above the Lake of Thun; Gurnigel; Seewis; Pontresina; Maloja; Rigi-First and Rigi-Kaltbad; and the localities on the heights above the Rhone valley, which have been previously mentioned; also Bormio, Courmayeur and Monte-Generoso, to the south of the main Alpine chain. In lower positions, Les Corbières above Aix-les-Bains, Badenweiler, Homburg, Royat, and most of the Pyrenean places, are suitable.

For many rheumatic cases a long stay at the seaside, after a course of waters, is preferable to a stay at mountain health resorts, owing to the strengthening influences which the sea air exercises on the skin. Bathing in the open sea is, however, to be avoided after the use of active spas, such as Karlsbad, Marienbad, Tarasp, Franzensbad, and Kissingen.

In cases of emphysema and bronchitis

In sufferers from emphysema and chronic bronchitis only moderate altitudes are borne, and it is desirable to select localities without wind and dust, situated if possible within or in the neighbourhood of large forests, pine

forests by preference. Such localities are the Flimser Waldhäuser (too high in very advanced cases), Ragatz and Weissenburg in Switerzland; Alt-Aussee, Kreuth and Achensee, and Zell-am-See, in the eastern Alps; the localities in the Harz Mountains mentioned above; Badenweiler, Baden-Baden, Wildbad, Teinach, Griesbach, Rippoldsau, &c. in the Black Forest; Hohwald and Gérardmer, in the Vosges Mountains; Alexandersbad in the Fichtelgebirge; Friedrichroda and Liebenstein in the Thuringian Forest; Schlangenbad and Koenigstein in the Taunus; Brückenau in Franconia.

Localities after a late cure

When courses of waters are taken late in the year, one of the more sheltered localities near the south slopes of the Alps can be selected for the after-cure. Such are Meran and Botzen in Tyrol; Locarno and Pallanza on Lago Maggiore; Cadenabbia, Bellaggio and Menaggio on the Lake of Como; Lugano, Varese, &c. The same applies to places near the shores of the Swiss Lakes, such as:—Ouchy (Lausanne) and Vevey and Montreux on the Lake of Geneva; Lucern and Brunnen and Gersau on the Lake of Lucern; Interlaken and Thun near the Lake of Thun, &c.

Localities in the United Kingdom

It is sometimes important that the after-cure be made nearer home, and there are a number of localities in England, Scotland, Wales and Ireland suitable for residence after spa treatment, though they have not the high elevation which might be desired for some cases. Many of them find a place in our list of marine spas (Chapter XVII.); others are mentioned in Chapter XVIII. Group III. amongst inland health resorts:—Buxton, Harrogate, Tunbridge Wells, Gilsland Spa, Llandrindod, Llangammarch, Llanwrtyd, Strathpeffer and Bridge-of-Allan (all also included amongst the ordinary spas); Ilkley, Ben Rhydding, Malvern, Pitlochry, Crieff, &c. (also mentioned in Chapter I. amongst the localities for hydrotherapeutic treatment). Suitable localities can be found in various districts in Surrey, including the neighbourhood of Leith Hill, and

the hills near Red Hill, Reigate, Dorking, Guildford, Godalming, and Haslemere, and the elevated ground extending from Red Hill eastward to Westerham and Sevenoaks in Kent. Further from London we have :— the neighbourhoods of Clifton in Gloucestershire and of Dartmoor in Devonshire; Llanberis (near Snowdon), Llangollen, Lake Vyrnwy Hotel, the Elan Valley Hotel, and other places in Wales; Braemar, Ballater, Forres, &c. in Scotland.

If we were to enter fully into the climatic conditions of the localities to be recommended for different invalids, for a stay after courses of waters, we should go beyond the sphere of this book; but enough has been said, we hope, to serve for guidance on this rather important matter.

Precautions during the after-cure

Whatever locality may be recommended, the invalid must always bear in mind that it is essential for him to spend as much time as possible in the open air, to avoid fatigue, to continue with a strict diet, and to be very careful with regard to dress, so as not to expose himself to chills.

BIBLIOGRAPHY[1]

Allbutt, T. Clifford.
A System of Medicine by Many Writers. London, 1896 *et seq.*
'On the Climate of Davos.' Various papers, *Lancet*, 1877–9.

Althaus, Julius.
The Spas of Europe. London, 1862.

Baeumler, Chr.
Introduction to the Discussion on Chronic Articular Rheumatism at the Berlin Medical Congress, 1897. *Verhandlungen des XV. Congresses, Wiesbaden*, 1897.

Bannatyne, G. A.
Rheumatoid Arthritis, its Pathology, Morbid Anatomy, and Treatment. Bristol, 1896.

Baraduc, A.
Châtel-Guyon. Paris, 1891.
Entérite Muco-Membraneuse. Paris, 1894.

Barnes, Robert.
Contribution in *The Climates and Baths of Great Britain.* London, 1895.

Baumann, Friedrich.
Schlangenbad. Wiesbaden, 1895.
'Die Wildbäder,' in Valentiner's *Handbuch.*

Baur, F.
Bad Nauheim. Second Edition, 1898.

Bazin, E.
Traitement des Affections de la Peau par l'emploi des Eaux Minérales. Paris, 1870.

Beissel, J.
Allgemeine Brunnendiätetik. Berlin, 1897.

Bélugou, M. A.
'Tabes et Eaux Minérales.' *Annales d'Hydrologie.* Paris, 1898. Nos. 4 and 5.

Beneke, F. W.
Ueber Nauheims Soolthermen. Marburg, 1859.

[1] This list does not include all the articles and books specially referred to in the text.

Beneke, F. W.—(*cont.*)
Weitere Mittheilungen über die Wirkungen der Soolthermen Nauheims. Marburg, 1861.
'Neue Erfahrungen über die Wirkungen der kohlensäurehaltigen Soolthermen Nauheims.' *Berliner klin. Wochenschrift*, 1875, p. 109.
Zur Therapie des Gelenkrheumatismus und der ihm verbundenen Herzkrankheiten. Berlin, 1872.

Bert, Paul.
La Pression Barométrique, Recherches de Physiologie Expérimentale. Paris, 1878.
'Sur la Richesse en Hémoglobine du Sang des Animaux vivant sur les Hauts Lieux.' *Comptes Rendus de l'Académie des Sciences.* Paris, 1882, vol. xciv. p. 805.

Black, J. G.
'Harrogate.' *Quarterly Medical Journal*, October 1895.

Blanc, Léon.
Rapport sur les Eaux Thermales d'Aix pendant l'Année 1880. Paris, 1881.
Aix-les-Bains and Marlioz. London, 1893.
Des Affections Cardiaques d'origine rhumatismale traitées aux Eaux d'Aix-les-Bains. Paris, 1886. Also English Edition, London, 1887.

Bordet, G.
Evian Médical. Second Edition, Evian-les-Bains, 1895.

Bosia, H. de.
De l'Arthritisme aux Eaux Thermales de Bourbon-Lancy. Macon, 1891.
Traitement des Maladies Chroniques du Cœur et des Vaisseaux par la Balnéation Thermale Chlorurée Gazeuse. Paris, 1895.

Bottentuit, Eugène.
'Catarrhal Enteritis.' *Brit. Med. Journ.*, April 16, 1892.
The Waters of Plombières. London, 1888.

Bottey, F.
Traité Théorique et Pratique d'Hydrothérapie Médicale. Paris, 1895.

Bouchard, Ch.
Lectures on Auto-intoxication in Disease. English translation by T. Oliver. Philadelphia and London, 1894.

Bowles, R. L.
'An Experimental Inquiry into the Schott Treatment of Certain Diseases of the Heart at Bad Nauheim.' *Practitioner*, July 1896.

Brabazon, A. B.
'Analysis of one hundred Cases of Rheumatoid Arthritis treated in the Royal Mineral Water Hospital, Bath.' *Brit. Med. Journ.*, 1896, vol. i. p. 723.

Brachet.
Aix-les-Bains. London, 1884.

Brandt, G. H., and **Brandt, J. E.**
Royat, Medical Guide. Fourth Edition, 1897.

Braun, Julius.

On the Curative Effects of Baths and Waters. English Edition, by Dr. Hermann Weber. London, 1875.

Systematisches Lehrbuch der Balneotherapie. Fifth Edition, by B. Fromm. Braunschweig, 1887.

Brehmer, Hermann.

Die chronische Lungenschwindsucht, ihre Ursache und ihre Heilung. First Edition, Berlin, 1857. Second Edition, Berlin, 1869.

Broadbent, J. F. H.

'On the Treatment of Chronic Heart Disease by the Methods of Dr. Schott of Nauheim.' *Practitioner*, 1895.

Broadbent, Sir William H., Bart.

'Notes on Auscultatory Percussion and the Schott Treatment of Heart Disease.' *Brit. Med. Journ.*, 1896, vol. i. p. 769.

„ and **Broadbent, J. F. H.**

Heart Disease, with special reference to Prognosis and Treatment. London, 1897.

Brunner, A.

Loèche-les-Bains. Fifth Edition. Vevey, 1887.

Brunton, T. Lauder.

'Atheroma and some of its Consequences, with their Treatment.' *Lancet*, October 12, 1895.

Articles on 'Dyspepsia,' &c., in Professor Clifford Allbutt's *System of Medicine*, vol. iii. London, 1897.

A Text-book of Pharmacology, Therapeutics, and Materia Medica. Third Edition. London, 1887.

„ and **Tunnicliffe, F. W.**

'On the Effects of the Kneading of Muscles upon the Circulation, local and general.' *Journal of Physiology*, December 1894.

Burton-Fanning, F. W.

'The Open Air Treatment of Phthisis in England.' *Lancet*, March 1898.

Cazaux, Marcellin.

'Sur l'Azote des Eaux Minérales.' *Annales d'Hydrologie.* Paris, February 1897.

Chabannes.

Guide Médicale aux Eaux Minérales de Vals-les-Bains. Eleventh Edition. Privas, 1884.

Clar, Conrad.

Boden, Wasser und Luft von Gleichenberg in Steiermark. Graz, 1881.

Die Winterstationen des alpinen Mittelmeergebiets. Leipzig and Vienna, 1894.

Clemow, F. G.

The Medicinal Waters and Muds of Russia. St. Petersburg, 1897.

Collin, Henry.

Guide à Saint-Honoré-les-Bains. Second Edition. Paris, 1889.

Cormack, C. E.
The Mineral Waters of Vichy. London, 1887.

Cruise, Sir F. R.
'Notes on Contrexéville.' *Lancet*, 1885.

Cullimore, D. H., and **Parke, T. H.**
The Book of Climates. Second Edition. London, 1891.

Danvers, H.
The Thermal Baths of Lucca, 1897.

Dapper, Carl.
'Untersuchungen über die Wirkung des Kissingen Mineralwassers auf den Stoffwechsel des Menschen.' *Berl. klin. Woch.*, 1895, No. 31.
'Ueber den Einfluss der Kochsalzquellen auf den Stoffwechsel des Menschen, und über die sogenannte curgemässe Diät.' *Zeitschr. f. klin. Medicin*, vol. xxx.

Debout-D'Estrées.
Medical Guide to Contrexéville. London, 1884.
'Contrexéville.' *Medical Record*, March 9, 1895.
'On the Various Explanations of Spontaneous Fracture of Stones in the Bladder.' *Brit. Med. Journ.*, May 9, 1896.

Deetz, W.
Homburg vor der Höhe und seine Heilfactoren. Second Edition, 1888.

Delastre, P.
Les Eaux Minérales de Brides-les-Bains et de Salins-Moutiers. Moutiers, 1897.
Les Albuminuriques aux Eaux de Brides-Salins. Paris, 1894.
Les Hépatiques aux Eaux Thermales de Brides-les-Bains. Paris, 1896.

Delfau, G.
'Hygiène et Thérapeutique Thermales,' in Prof. Proust's *Bibliothèque d'Hygiène Thérapeutique.* Paris, 1896.
'Les Cures Thermales.' Another volume in Prof. Proust's series. Paris, 1897.

Delmas, Maurice.
Etude Générale du Bain de Boues. Dax, 1896.

Derscheid, G.
Tuberculose Laryngée et Altitude. Brussels and Davos, 1897.

Dettweiler, P.
Die Behandlung der Lungenschwindsucht in geschlossenen Heilanstalten, mit besonderer Beziehung auf Falkenstein am Taunus. Berlin, 1880.
Bericht über zweiundsiebzig völlig geheilte Fälle von Lungenschwindsucht. Frankfurt a. M., 1886.

Dickinson, W. H.
Treatise on Diabetes. 1874.
Contribution in *The Climates and Baths of Great Britain.* London, 1895.
Article on 'Renal Diseases' in Allbutt's *System of Medicine*, vol. iv. 1897.

Diruf, senior, Oscar.
Kissingen. Its Baths and Mineral Springs. Würzburg, 1887.
'Die Bitterwässer,' in Valentiner's *Handbuch.*
„ and **Niebergall.**
'Die Kochsalzwässer,' in Valentiner's *Handbuch.*

Doyon, A.
Uriage et ses Eaux Minérales. Second Edition. Paris. 1884.
'Traitement de la Syphilis par les Eaux Sulphureuses.' *Annales d'Hydrologie*, Paris, vol. xxix.

Dresch.
Ax Thermal. Foix, 1894.
La Fièvre Thermale. Paris, 1897.

Duckworth, Sir Dyce.
A Treatise on Gout. London, 1890.
Article on 'Obesity,' in Allbutt's *System of Medicine*, vol. iv. 1897.

Dufresse de Chassaigne, J. E.
Mémoire sur le Traitement et la Guérison de l'Anévrysme Rhumatismal du Cœur (*i.e.* Rheumatic Valvular Disease) *sous l'Influence de l'Usage des Eaux Thermales de Bagnols.* Angoulême, 1859.

Duhourcau, E.
Cauterets, ses Eaux Minérales et leurs Effets Curatifs. Paris, 1882.
Du Rôle Actif de l'Azote Gazeux dissous dans les Eaux Minérales. Paris, 1897.

Dujardin-Beaumetz, Georges.
Dictionnaire de Thérapeutique et des Eaux Minérales. Paris, 1883–1889.

Durand-Fardel, Max.
Traité des Eaux Minérales. Third Edition. Paris, 1883.
„ **Le Bret, E., Lefort, J.,** and **François, J.**
Dictionnaire Général des Eaux Minérales. 2 vols. Paris, 1860.

Eardley-Wilmot, R.
On the Natural Mineral Waters and Spa of Leamington. 1890.

Ebbesen and **Hoerbye.**
The Sulphureous Bath at Sandefjord in Norway. (English Language.) Christiania, 1862.

Ebermayer, Ernst.
Die physicalischen Einwirkungen des Waldes auf Luft und Boden. Aschaffenburg, 1873.

Eccles, A. Symons.
'On the Advantages of Oxidation.' *West London Medical Journal*, 1896, p. 4.
The Practice of Massage. Second Edition. London, 1898.

Egasse, E., and **Guyenot, P.**
Eaux Minérales Naturelles autorisées de France et de l'Algérie. Second Edition. Paris, 1892.

Egger, F.

'Ueber Veränderungen des Blutes im Hochgebirge.' *Verhandlungen d. XV. Congresses f. innere Med.* (Wiesbaden, 1893), p. 262.

Ueber die Indikationen f. den Hochgebirgsaufenthalt Lungenkranker. Basel, 1897.

„ **Karcher, J., Miescher, F., Suter, F.,** and **Veillon, E.**

'Untersuchungen über den Einfluss des Höhenklimas auf die Beschaffenheit des Blutes.' A series of articles in *Archiv für exp. Pathologie und Pharmakologie*, 1897, vol. xxxix.

Emond, E. Em.

The Mont-Dore Thermal Springs. English Edition. Paris, 1896.

Ewart, William.

Gout and Goutiness and their Treatment. London, 1896.

Ewich, Otto.

Praktisches Handbuch über die vorzüglichsten Heilquellen und Curorte. Berlin, 1862.

Felix, Jules.

'De l'Emploi Thérapeutique des Silicates Alcalines et des Eaux Minérales Naturelles Silicatées.' *Annales d'Hydrologie.* Paris, February and March 1898.

Flechsig, Robert.

Bad Elster. Third Edition. Leipzig, 1894.

Bäder-Lexikon. Second Edition. Leipzig, 1889.

Handbuch der Balneotherapie. Second Edition. Berlin, 1892.

Balneological Notices in Schmidt's *Jahrbücher der gesammten Medicin.*

Fleury, L.

Traité pratique et raisonné d'Hydrothérapie. First Edition. Paris, 1852.

Flinn, D. Edgar.

Ireland: its Health Resorts and Watering-Places. Second Edition. Dublin, 1895.

Forestier, Henri.

Le Traitement Thermal d'Aix-les-Bains. Aix-les-Bains, 1895.

'On the Physiological Action of the Sulphur Douche-Massage of Aix-les-Bains in the Treatment of Articular Gout. *Medical Press and Circular*, April 8, 1891.

Foster, M. G.

See Weber, Hermann, and Foster, M. G., Article on Climate in Allbutt's *System of Medicine*, 1896.

'On the Selection of Winter Resorts for the Phthisical.' *Treatment.* 1897.

Fowler, J. K., and **Godlee, R. J.**

The Diseases of the Lungs. London, 1898.

Fox, R. F.

Strathpeffer Spa, its Waters and Climate. Third Edition. London, 1896.

Fox, Wilson.
A Treatise on Diseases of the Lungs and Pleura. Edited by Sidney Coupland. London, 1891.

Foxwell, Arthur.
The Spas of Mid-Wales. Birmingham, 1897.

Freeman, H. W.
The Thermal Baths of Bath. London, 1888.
The New Methods of Cure at the Hot Mineral Baths of Bath. Bath, 1897.

Frerichs, Th. von.
Ueber den Diabetes. Berlin, 1884.

Friedlænder, R.
Beiträge zur Anwendung der physikalischen Heilmethoden. Wiesbaden, 1896.

Fromm, B.
Fifth Edition of Braun's *Lehrbuch der Balneotherapie.* 1887.

Gager, C.
Bad Gastein. Berlin, 1897.

Gandy.
Traitement des Neurasthéniques aux Eaux de Bagnères-de-Bigorre. Paris, 1894.

Garelli, G.
Acque Minerali d' Italia. 1864.

Garrigou, F.
'Les Divers Groupes Pyrénéens' (Hydrologie, Climatologie). *Le Bulletin Médical des Stations Pyrénéennes.* December 1894.
Synthèse Hydrologique, Thérapeutique et Clinique Hydro-balnéaires des Pyrénées. 1897.

Garrod, A. E.
Contributions in *The Climates and Baths of Great Britain.* London, 1895.
Articles on 'Chronic Rheumatism,' &c., in Professor Clifford Allbutt's *System of Medicine*, vol. iii. London, 1897.

Garrod, Sir A. B.
Treatise on Gout and Rheumatic Gout. Third Edition. London, 1876.
'Rheumatoid Arthritis,' in Reynolds's *System of Medicine.* London, 1866.

Geissé, N.
The Springs of Ems. Ems, 1892.

Genth, Carl.
'Ueber die Veränderung der Harnstoffausscheidung bei dem innerlichen Gebrauche des Schwalbacher kohlensauren Eisenwassers,' in *Deutsch. med. Wochenschrift*, 1887, No. 46.

Gibotteau, A.
Biarritz. 1897

Glatz, Paul.
Réflexions sur l'Empirisme en Médecine à propos d'Hydrothérapie. Second Edition. Geneva, 1894.
Dyspepsies Nerveuses et Neurasthénie. Bâle, 1898.

Glax, Julius.
Lehrbuch der Balneotherapie. Stuttgart, 1897.

Glover, R. M.
On Mineral Waters. London, 1857.

Gottstein, A.
'Ueber Blutkörperchenzählung und Luftdruck.' *Berliner klin. Wochenschr.*, 1898, Nos. 20 and 21.

Granville, A. B.
The Spas of Germany. Second Edition. London, 1838.
The Spas Revisited. London, 1843.
The Spas of England. 3 vols. London, 1841.

Groedel, J.
'Baths and Gymnastics in Arteriosclerosis.' *Lancet*, April 17, 1897.

Grossmann, Fr.
'Die alkalischen Quellen,' in Valentiner's *Handbuch.*
Die Heilquellen des Taunus, dargestellt von einem Vereine von Aerzten. Wiesbaden, 1887.

Grube, Karl.
Allgemeine und specielle Balneotherapie. Berlin, 1897.
'Einige Beobachtungen über die Bedeutung des Kalkes bei Diabetes mellitus.' *Münchener med. Wochenschr.*, 1895, No. 22.
'Weitere Beobachtungen über Kalkbehandlung bei Diabetes mellitus, nebst Bemerkungen über Acetonurie.' *Therapeutische Monatshefte*, May 1896.

Gsell-Fels, Th.
Die Bäder und klimatischen Kurorte der Schweiz. Third Edition. Zürich, 1894.

Guentz, J. E.
Neue Erfahrungen über die Behandlung der Syphilis und Quecksilberkrankheit, mit besonderer Berücksichtigung der Schwefelwässer und Soolbäder. Dresden, 1878.

Guéridaud, J.
Les Eaux de Saint-Gervais. Vichy, 1896.

Gully, J. M.
The Simple Treatment of Disease. London, 1842.

Hann, Julius.
Handbuch der Klimatologie. Second Edition. Stuttgart, 1897.

De La Harpe, Eugène.
La Suisse Balnéaire et Climatique. Second Edition. Zürich, 1897.
Formulaire des Eaux Minérales. Third Edition. Paris, 1896.
Louèche-les-Bains. Paris, 1893.

Hayem, G.
Leçons de Thérapeutique. Les agents physiques et naturels. Paris, 1894. There is an English Edition entitled *Physical and Natural Therapeutics*, by Prof. H. A. Hare, of Philadelphia. Edinburgh and London (Pentland), 1895.

Head, Sir F. B., Bart.
Bubbles from the Brunnens of Nassau. First Edition. London, 1834. This amusing work, published anonymously, although not strictly medical, is mentioned here on account of its great interest with regard to the spas of Schlangenbad, Schwalbach, &c.

Heineman, H. N.
'The Physical Treatment of Chronic Heart Disease.' Translated from the *Deutsche med. Wochenschr.*, 1896, No. 33.

Helfft, H.
Handbuch der Balneotherapie. Ninth Edition. Edited by G. Thilenius. Berlin, 1882.

Hess, Karl.
'The Treatment of Phthisis at the Falkenstein Sanatorium on Mount Taunus.' *Practitioner*, November 1897.

Hoffmann, F. A.
'Diätetische Kuren,' in Von Leyden's *Handbuch der Ernährungstherapie.* Leipzig, 1898, vol. i.

Huggard, W. R.
Davos Platz. 1886.

Hughes, Henry.
'Zur Wirksamkeit der Mineralbäder,' in *Deutsch. med. Woch.*, 1893, Nos. 50–52.

Huguenin, G.
L'Eau Thermale de Weissembourg. Bienne, 1893.

Hunter, W.
Articles on the Liver in Allbutt's *System of Medicine*, vol. iv. 1897.

Hyde, Samuel.
The Causes and Treatment of Rheumatoid Arthritis. London, 1896.
'The Treatment of Cardiac Disease by Baths, Exercises and Climate.' *Medical Magazine*, 1898. vol. vii.

Jaccoud, S.
The Curability and Treatment of Pulmonary Phthisis. Translated by Montagu Lubbock. London, 1885.

Jacob.
Grundzüge der Balneotherapie. 1870.

James, Constantin, and Aud'houi, Victor.
Guide Pratique aux Eaux Minérales. Fifteenth Edition. Paris, 1896.

James, Prosser (jointly with **Tichborne, C. R. C.**).
The Mineral Waters of Europe. London, 1883.

Jaruntowsky, A. von.
The Private Sanatoria for Consumptives. Translated by Dr. E. Clifford Beale. London, 1896.

„ and **Schroeder, G.**
'Ueber Blutveränderungen im Gebirge.' *Münchener med. Wochenschr.*, 1894, p. 945.

Jones, W. Black.
Llangammarch Wells as a Health Resort. London, 1898.

Jonquière, G.
Die Schwefelbäder und der Kurort an der Lenk. Zürich, 1893. Supplement, 1897.

Keller, H.
Das Soolbad Rheinfelden. Rheinfelden, 1892.
'Wandelungen in der Soolbadtherapie.' *Correspondenz-Blatt für Schweizer Aerzte*, 1895, No. 6.
'Du Traitement de l'Anémie (Chlorose) par les Bains Salins de Haute Minéralisation.' Paris, 1896.
'Die Menstruation und ihre Bedeutung für Kurprozeduren.' *Deutsche Medizinal-Zeitung*, 1897.

Kennedy, Henry.
Observations on Fatty Heart. Eighth Edition. Dublin, 1880.

Kerr, J. G. Douglas.
Popular Guide to the Use of the Bath Waters. Eleventh Edition, 1898.

Kisch, E. H.
Balneotherapeutisches Lexikon für praktische Aerzte. Vienna and Leipzig, 1897.
'Die Ernährungstherapie bei Lipomatosis Universalis.' *Wiener med. Presse*, 1898, No. 11.

Klein, Carl.
The Remedies of Franzensbad. Franzensbad, 1889.

Knopf, S. A.
Les Sanatoria, Traitement et Prophylaxie de la Phtisie Pulmonaire. Paris, 1895.

Kraus, F., junior.
'Die Resorption des Nahrungsfettes unter dem Einflusse des Karlsbader Mineralwassers.' *Berliner klin. Wochenschr.*, 1897, No. 21.

Kraus, J., senior.
Carlsbad, its Thermal Springs and Baths. Fourth Edition. London.
The Etiology, Symptoms, and Treatment of Gall Stones. (With additional remarks on Operative Treatment by Henry Morris.) London, 1896.

Labat, A.
Voyage en Auvergne, le Sol, le Climat et les Eaux Minérales. Paris, 1896.

Laissus, C.
Les Eaux Thermales de Brides-les-Bains et de Salins-Moutiers. Second Edition. Paris, 1896.

Lane, H.
General Hints on the Use of the Baths at Bath. 1892.

Larauza, Albert.
Les Applications Locales des Boues de Dax.
Du Traitement de la Nevralgie Sciatique par les Eaux et Boues Minérales de Dax. Paris, 1889.

Latham, P. W.
On Nervous or Sick Headache. Cambridge, 1873.
Articles on 'Headache' and 'Megrim' in Quain's *Dictionary of Medicine.*

Lehmann, L.
Die Sooltherme zu Bad Oeynhausen und das gewöhnliche Wasser. Göttingen, 1856.
Die chronischen Neurosen als klinische Objekte in Oeynhausen. Bonn, 1880.

Lehmann, S. E.
Ueber Adhäsion der Badestoffe an der Haut. Bonn, 1876.

Leichtenstern, Otto.
'General Balneotherapeutics,' in Von Ziemssen's *Handbook of General Therapeutics.* English Translation by Dr. John Macpherson. London, 1885.

Leith, R. F. C.
'Action of Thermal Saline Baths and Resistance Exercises in the Treatment of Chronic Heart Disease.' *Lancet*, March 21 and 28, 1896.

Léon-Petit, E. P.
Le Phtisique et son Traitement Hygiénique. Paris, 1895.

Leroux, Charles.
L'Assistance Maritime des Enfants et les Hôpitaux Marins. Paris, 1892.

Lersch, B. M.
Die phys. und therap. Fundamente der prakt. Balneologie. 1868.

Leudet, Lucien.
'Les Bronchitiques Goutteux aux Eaux-Bonnes.' Second Edition. Paris, 1893.

Leusser, J.
'Kissingen für Herzkranke.' *St. Petersburger Medicinische Wochenschrift*, 1898, Nos. 8 and 9.

Leva, J.
'Ueber die Einwirkung des Tarasperwassers auf den Stoffwechsel.' *Berliner klin. Wochenschr.*, 1894, No. 11.

Liebig, G. von.
Reichenhall, sein Klima und seine Heilmittel. Sixth Edition. Reichenhall, 1889.

Lindsay, J. A.
'The Problem of the Consumptive Poor.' *Lancet*, 1897, vol. ii. p. 1435.

Linn, Thomas.
The Health Resorts of Europe. Fourth Edition. London, 1896.

Liveing, Edward.
On Megrim, &c. London, 1873.

Liveing, Robert.
Articles on Skin Diseases in Quain's *Dictionary of Medicine.* Second Edition. 1894.

Lombard, H. C.
Des Climats de Montagne considérés au point de vue médical. First Edition. Geneva, 1856.

London, B.
'Ueber den Einfluss des kochsalz- und glaubersalzhaltigen Mineralwassers.' *Zeitschrift für klin. Medizin*, vol. xiii.

Ludwig, E., and Clar, C.
Ueber die Constantinquelle in Gleichenberg. Wien, 1896.

Luff, A. P.
'The Pathology and Treatment of Gout.' *Lancet*, 1898, vol. i. p. 147.

Macé.
Guide aux Villes d'Eaux. By various Authors. First Edition. Paris, 1881.

Macpherson, John.
The Baths and Wells of Europe. Third Edition. London, 1888.
Our Baths and Wells: the Mineral Waters of the British Islands. London, 1871.

Madden, T. M.
'On the Use of Mineral Waters in the Treatment of some Gynæcological Complaints.' *The Scalpel*, April 1897.

Mapother, E. D.
'The Irish Sulphur Spas,' in his *Papers on Dermatology.* London, 1889.

Marcet, William.
The Principal Southern and Swiss Health Resorts. London, 1883.

Mayer, Jacques.
Modern Methods for the Cure of Obesity. Translated by W. D. Butcher. Windsor, 1889.

Mayer, M.
Die Kochsalzquellen und Soolbäder. Wien, 1897.

Meissen, E., and Schroeder, G.
'Zur Frage der Blutveränderungen im Gebirge.' *Münchener med. Wochenschrift*, 1897, Nos. 23 and 24.
'Eine vom Luftdruck unabhängige Zählkammer für Blutkörperchen.' *Münchener med. Wochenschrift*, 1898, No. 4.

Méneau, Julien.
La Bourboule et ses Indications. Paris, 1896.

Mercier, A.
'Des Modifications de Nombre et de Volume que subissent les Erythrocytes sous l'influence de l'Altitude.' *Archives de Physiologie*, Paris, 1894, vol. vi.

Meyer-Ahrens, C.
Die Heilquellen und Kurorte der Schweiz. First Edition. Zürich, 1860.

Miescher, F.
'Ueber die Beziehungen zwischen Meereshöhe und Beschaffenheit des Blutes.' *Correspondenzblatt für Schweizer Aerzte*, 1893, No. 24, p. 809.

Mordhorst, C.
'On the Pathogenesis of Gout.' *Lancet*, 1897, vol. ii. p. 131.

Morison, A.
Cardiac Failure and its Treatment, with especial Reference to the Use of Baths and Exercises. London, 1897.

Morris, Malcolm A.
Contributions in *The Climates and Baths of Great Britain.* London, 1895.

Müller, Franz C.
The Balneological Notices in Schmidt's *Jahrbücher der gesammten Medicin*, from the year 1893 (after R. Flechsig's death).

Müller, Friedrich.
'Allgemeine Pathologie der Ernährung,' in Von Leyden's *Handbuch der Ernährungstherapie und Diätetik.* Leipzig, 1897, vol. i.

Müntz, A.
'De l'Enrichissement du Sang en Hémoglobine suivant les conditions d'existence.' *Comptes Rendus de l'Académie des Sciences*, Paris, 1891, vol. cxii. p. 298.

Myrtle, A. S., and **Myrtle, A.**
Practical Observations on Harrogate Mineral Waters. 1892.

Neisser, A.
'Syphilis und Balneotherapie.' *Berliner klin. Wochenschr.*, 1897, Nos. 16 and 17.

Neukomm, M.
Bad Heustrich. Thun, 1897.

Von Noorden, Carl.
Lehrbuch der Pathologie des Stoffwechsels. Berlin, 1893.
Die Zuckerkrankheit und ihre Behandlung. Berlin, 1895.
'On the Influence of the Salt Springs of Homburg, Kissingen, &c., on Metabolism in Man.' *The Practitioner*, London, March 1896.
„ and **Dapper, Carl.**
'Ueber den Stoffwechsel fettleibiger Menschen bei Entfettungscuren.' *Berl. klin. Woch.*, 1894, No. 24.

Norström, Gustaf.
Handbook of Massage. New York, 1896.

Oertel, M. J.
'Handbuch der allgemeinen Therapie der Kreislaufs-Störungen.' Fourth volume of Von Ziemssen's *Handbuch der allgemeinen Therapie.* Fourth Edition. Leipzig, 1891.
Ueber Terrain-Curorte zur Behandlung von Kreislaufs-Störungen. Leipzig, 1886.

Oliver, G.
The Harrogate Waters. 1881.
'A Contribution to the Study of the Blood and the Circulation.' Croonian Lectures before the Royal College of Physicians of London. *Lancet*, 1896, vol. i.
'A Contribution to the Discussion on the Treatment of Cardiac Disease by Baths, Exercises and Climate.' *Medical Magazine*, April 1898.

Ord, W. M.
Contributions in *The Climates and Baths of Great Britain.* London, 1895.

Ott, A.
Introduction to the Discussion on the Treatment of Chronic Articular Rheumatism at the Berlin Medical Congress, 1897. *Verhandlungen des XV. Congresses*, Wiesbaden, 1897.

Pavy, F. W.
Researches on the Nature and Treatment of Diabetes. Second Edition. London, 1869.
Physiology of the Carbohydrates. 1894.

Penrose, F.
Contributions in *The Climates and Baths of Great Britain.* London, 1895.

Penzoldt, Franz.
'Behandlung der Lungentuberculose,' in *Handbuch der speciellen Therapie innerer Krankheiten*, vol. iii. Jena, 1895.

Pernisch, J.
Der Kurort Tarasp-Schuls. Fourth Edition. Chur, 1892.

Petit, C. A.
Guide Médical aux Eaux de Royat. Tenth Edition. Paris, 1896.

Pfeiffer, Emil.
'Thermal-Badecuren zu diagnostischen Zwecken,' *Berliner klin. Wochenschr.*, 1896, p. 247.

Powell, Sir R. Douglas.
Diseases of the Lungs and Pleuræ, including Consumption. Fourth Edition. London, 1893.
The Lumleian Lectures on the 'Principles which govern Treatment in Diseases and Disorders of the Heart.' *Lancet*, 1898, vol. i.

Proust, A. A.
Traité d'Hygiène publique et privée. Second Edition. Paris, 1881.

Pujada, P.
Etudes sur Amélie-les-Bains. Céret, 1887.

Quain, Sir Richard, Bart.
'On Fatty Diseases of the Heart,' in *Med. Chir. Trans.* 1850.
Lumleian Lectures on *Diseases of the Muscular Walls of the Heart.* 1872.

Quincke, H.
Balneolog. Tafeln. 1872.

Rae, W. Fraser.
Austrian Health Resorts and the Bitter Waters of Hungary. London, 1888.

Ranglaret, A.
'Contribution à l'Etude de la Douche-Massage d'Aix-les-Bains.' *Annales d'Hydrologie*, Paris, November 1896, p. 491.

Ranse, F. de.
Néris-les-Bains et ses Eaux Minérales. Paris, 1883.
'Note Clinique sur le Traitement Hydrominéral de l'Angine et des Pseudo-Angines de Poitrine.' *Bulletin de l'Acad. de Médecine*, Paris, April 21, 1896.

Ransome, Arthur.
The Treatment of Phthisis. London, 1896.
Researches on Tuberculosis. The Weber-Parkes Prize Essay, 1897. London, 1898.
'Open-air Treatment of Phthisis at Bournemouth.' *Lancet*, 1898, vol. i., p. 1603.

Raugé, Paul.
Challes et ses Indications. Nice, 1888.

Regnard, Paul.
La Cure d'Altitude. Paris, 1897.

Regnault, P.
Bourbon-L'Archambault, ses Eaux Minérales et ses Nouveaux Thermes. Paris, 1886.

Reimer, Hermann.
Handbuch der speciellen Klimatotherapie und Balneotherapie. Berlin, 1889.

Von Renz, Wilh. Theodor.
Die Heilkräfte der sogenannten indifferenten Thermen, insbesondere bei Krankheiten des Nervensystems. Tübingen, 1878.

Reumont, A.
'Die Schwefelquellen,' in Valentiner's *Handbuch.*
Die Thermen von Aachen und Burtscheid. 1885.

Revillet, L.
The Sulphuretted Waters of Allevard in Chronic Diseases of the Respiratory Organs. English Edition, 1897.

Ringer, S., and Sainsbury, H.
A Handbook of Therapeutics. Thirteenth Edition. London, 1897.

Roberts, Frederick.
Contributions in *The Climates and Baths of Great Britain.* London, 1895.

Roberts, T. R.
The Spas of Wales. London, 1897.

Roberts, Sir William.
Croonian Lectures *On the Chemistry and Therapeutics of Uric Acid Gravel and Gout.* London, 1892.
Article on 'Gout,' in Professor Clifford Allbutt's *System of Medicine*, vol. iii. London, 1897.

Robertson, W. H.
'The Medical Value of the Nitrogenous Tepid Water of Buxton.' *Lancet*, 1872 and 1874.

Robin, Albert.
'La Balnéation Chlorurée Sodique.' *Bulletin de l'Académie de Méd.* Paris, 1891, vol. xxv. p. 746.
'Des Albuminuries Phosphaturiques.' *Bulletin de l'Académie de Médecine.* Paris, December 19, 1893.

Robin, Albert—*continued.*

'Des Albuminuries Dyspeptiques.' *Bulletin de l'Académie de Médecine.* Paris, August 17, 1897.

'Traitement Hydro-minéral des Albuminuries d'Origine Fonctionnelle ou Rénale. *Annales d'Hydrologie*, Paris, 1896, p. 30.

Rochard, Jules.

Les Hôpitaux Marins.' *Revue des Deux Mondes.* August 1890.

'Villégiature, Bains de Mer et Stations Thermales. *Revue des Deux Mondes.* July 1895.

Roehrig.

Die Physiologie der Haut. Berlin, 1896.

Rohden.

'Treatment of Phthisis,' in Braun's *Curative Effects of Baths and Waters.* London, 1875.

Rollet, A.

'Betrachtungen über Mauserung des Blutes.' *Wiener klin. Wochenschr.*, 1894, No. 31.

Rosemann, Rudolf.

Die Mineral-Trinkquellen Deutschlands. Greifswald, 1897.

Roth, Heinrich.

Die Bedeutung des kalten Schwefelwassers zu Bad Weilbach in Unterleibskrankheiten, Brust- und Halsleiden geschildert. Wiesbaden, 1854.

Rotureau, A.

Contributions on Mineral Waters in the *Dictionnaire Encyclopédique des Sciences Médicales.* Paris, 1864 to 1889.

Sansom, A. E.

'On the Treatment of Affections of the Heart and the Circulation by Baths, Exercises, and Climate.' *Lancet*, 1898, vol. i, p. 850.

Saundby, Robert.

'Remarks on the Nauheim (Schott) Treatment of Heart Disease.' *Brit. Med. Journ.*, November 2, 1895.

Article on 'Diabetes Mellitus' in Professor Clifford Allbutt's *System of Medicine*, vol. iii. London, 1897.

Savill, T. D.

'The Therapeutics of Saline Laxative Mineral Waters.' *Lancet*, November 23, 1895.

'On the Pathology of Itching and its Treatment by Large Doses of Calcium Chloride.' *Lancet*, August 1, 1896.

Schetelig, A.

Homburg Spa. London, 1893.

Scheuer, Victor.

Traité des Eaux de Spa. Second Edition. Brussels, 1881.

Essai sur l'Action Physiologique et Thérapeutique de l'Hydrothérapie. Paris, 1885.

Schivardi, Plinio.

Guida alle Acque Minerali ed ai Bagni d' Italia. Fourth Edition. Milano, 1895.

Schnyder, H.
Les Eaux Thermales de Weissembourg. Bienne, 1881.

Schott, August.
'Die Bedeutung d. Gymnastik f. d. Diagnose, Prognose u. Therapie d. Herzkrankheiten.' *Zeitschrift für Therapie.* 1885.

Schott, August, und Schott, Theodor.
'Die Nauheimer Sprudel and Sprudelstrombäder.' *Berl. klin. Woch.*, 1884, No. 19.

Schott, Theodor.
'The Treatment of Chronic Diseases of the Heart by means of Baths and Gymnastics.' *Lancet*, 1890.
The Mineral Waters of Nauheim. London, 1894.

Schuecking, A.
Pyrmont. English Edition. Pyrmont, 1891.

Schuetze, C.
'Die Hydrotherapie der Lungenschwindsucht.' *Archiv der Balneotherapie und Hydrotherapie*, 1898.

Schulz, Hugo.
Studien über die Pharmakodynamik des Schwefels. Greifswald, 1896.

Seegen, Joseph.
Handbuch der allgemeinen und speciellen Heilquellenlehre. Second Edition. Vienna, 1862.
Physiologisch-chemische Untersuchungen über den Einfluss des Glaubersalzes auf einige Factoren des Stoffwechsels. Vienna, 1864.
Die Zuckerbildung im Thierkörper. Berlin, 1890.

Semon, Sir F., Williams, W., and Hall, F. de H.
Articles on the Pharynx and Larynx, in Allbutt's *System of Medicine*, vol. iv. 1897.

Senator, H.
'Bäder, klimatische Kuren, Bewegungstherapie,' in *Handbuch der Ernährungstherapie und Diätetik*, edited by Professor E. von Leyden, vol. i. Leipzig, 1897.

Smith, Archibald.
'Climate of the Swiss Alps and Peruvian Andes compared.' *Dublin Quarterly Journal of Med. Sciences*, 1886.

Smith, R. Angus.
Air and Rain: the Beginnings of a Medical Climatology. London, 1872.

Solly, S. E.
A Handbook of Medical Climatology. Philadelphia, 1897.

Sparks, E. J.
The Riviera. London, 1879.

Spengler, Alex.
Indicationen für und gegen Davos. Davos, 1879.

Spengler, Carl.
'Ueber Lungentuberculose und bei ihr vorkommende Mischaffectionen.' *Zeitsch. f. Hygiene*, 1894, vol. xviii.

Spengler, Lucius.
'Zur Phthisiotherapie im Hochgebirge.' *Fortschritte der Krankenpflege*, 1893.

Stern, B. A. P.
Bad Weilbach und seine Mineralquellen. Wiesbaden, 1896.

Stifft, H.
Die phys. und ther. Wirkung des Schwefelwasserstoffgases. Berlin, 1886.
'Die Mineralquellen zu Bad Weilbach,' in Grossmann's *Heilquellen des Taunus*, 1887.

Stoecker, A.
Bad Wildungen. Fourth Edition. Edited by Dr. Marc. London, 1895.
'Die erdigen Mineralquellen,' in Valentiner's *Handbuch.*

Suchard, A. F.
Résumé de cent et une Observations de Maladies variées traitées par les Bains de Sable à Lavey-les-Bains. Paris, 1896.

Sutro, Sigismund.
Lectures on the German Mineral Waters. Second Edition. London, 1865.

Thilenius, G.
Ninth Edition of Helfft's *Handbuch der Balneotherapie.* Berlin, 1882.

Thiroux, H.
Polyarthrite Déformante Progressive, son Traitement par les Boues Thermales. Paris, 1896.
Contribution à l'Etude des Troubles Chroniques de la Circulation Veineuse des Membres Inférieurs, leur traitement par les Boues Thermales. Paris, 1896.

Thompson, E. Symes.
'On the Health Resorts of the Alps.' *Med. Press and Circ.* London, 1883.

Thorne, W. Bezly.
The Schott Methods of the Treatment of Chronic Diseases of the Heart. Second Edition. London, 1896.
'Notes on Certain Changes in the Cardio-vascular System which are induced by treatment according to the Schott Methods.' *Brit. Med. Journ.*, 1896, vol. i. p. 653.

Tichborne, C. R. C., and **James, Prosser.**
The Mineral Waters of Europe. London, 1883.

Trudeau, E. L.
'Sanatoria for the Treatment of Incipient Tuberculosis.' *New York Med. Journ.*, 1897, vol. lxv. p. 276.

Tunnicliffe, F. W.
Article with Dr. Brunton in the *Journal of Physiology*, December 1894.

Valentiner, Th.
Handbuch der allgemeinen und speciellen Balneotherapie. Berlin, 1873.

Veraguth, C.
Bad St. Moritz. Zürich, 1887.

Verdat, E.
Eaux Minérales Sulphureuses du Gurnigel. Paris and Berne, 1879.

Verdenal.
Essai d'une Application de la Bactériologie à la Médecine Thermale. Paris, 1896.

Vérité, Alfred.
'Note sur La Bourboule.' *Ann. de la Soc. d'Hydrologie Médicale de Paris*, vol. xxiv.
'Des Eruptions Thermales, leur Signification aux Eaux de La Bourboule.' *Ann. de la Soc. d'Hydrologie Médicale de Paris*, vol. xxii.

Viault, Fr.
'Action Physiologique des Climats de Montagne.' *Comptes Rendus de l'Acad. des Sciences*, 1892, vol. cxiv.
'Sur l'Augmentation considérable du Nombre des Globules Rouges dans le Sang chez les Habitants des Hauts Plateaux de l'Amérique du Sud. *Comptes Rendus de l'Acad. des Sciences*, 1890, vol. cxi.

Vintras, A.
Medical Guide to the Mineral Waters of France. Second Edition. London, 1892.

Vogelsang, A.
Erfahrungen über Tarasper Kuren. Bern, 1897.

Vollmer, E.
'Ueber balneologische Behandlung der Lues.' *Arch. der Balneotherapie und Hydrotherapie.* Halle a. S., 1897.

Wassing, Ant.
Der Curort Wildbad-Gastein. Vienna, 1896.

Waters, A. W.
Winter im Hochgebirge, 1871.

Weber, F. Parkes.
'Holidays and Spa Treatment in Certain Forms of Dyspepsia, and the Possibility of Arresting Chronic Non-infectious Diseases.' *Treatment.* London, 1897.

Weber, Hermann.
Article on 'Mineral Waters' in Quain's *Dictionary of Medicine.* Second Edition. London, 1894.
English Edition of Braun's Work *On the Curative Effects of Baths and Waters.* London, 1875.
'The Treatment of Disease by Climate.' English translation by Dr. H. Port in Von Ziemssen's *Handbook of General Therapeutics*, vol. iv., London, 1885.
'Climate and Health Resorts,' in *The Book of Health*, edited by Malcolm Morris. London, 1883.
'Health Resorts and Waters for the Anæmic.' *Practitioner*, 1897.
'Notes on the Climate of the Swiss Alps.' *Dublin Quarterly Journal of Med. Science*, 1864, vol. xxxvii.

Weber, Hermann—*continued.*
'On the Treatment of Phthisis by Prolonged Residence in Elevated Regions.' *Med. Chir. Trans.*, London, 1869, vol. lii.
Croonian Lectures on the Hygienic and Climatic Treatment of Chronic Pulmonary Phthisis. London, 1885.
'Zur Verhütung der Senilitas Praecox.' *Zeit. f. diät. u. phys. Ther.*, 1898, vol. i. p. 11.

,, and **Foster, M. G.**
'Climate in the Treatment of Disease,' in *A System of Medicine*, edited by Professor T. Clifford Allbutt, vol. i. London, 1896.

,, and **Weber, F. Parkes.**
'Balneology and Hydrotherapeutics,' in *A System of Medicine*, edited by Professor T. Clifford Allbutt, vol. i. London, 1896.

Weber, Victor.
Das Schwefelbad zu Alvaneu. Third Edition, by Dr. Schnoeller. Samaden, 1897.

Werra, J. de.
Der Kurort Leukerbad. Sitten, 1895.

Will, H.
Der Kurort Homburg vor der Höhe. Homburg, 1881.
Dietetic and Therapeutic Hints to the Visitors of Bad Homburg. Homburg, 1893.

Williams, C. J. B. and **Williams, C. Theodore.**
Pulmonary Consumption. Second Edition. London, 1887.

Williams, C. Theodore.
The Climate of the South of France. Second Edition. London, 1870.
Aero-therapeutics. London, 1894.
'The Open-Air Treatment of Pulmonary Tuberculosis.' *Brit. Med. Journ.*, 1898, vol. i. p. 1309.

Wilson, James.
The Water Cure. Third Edition. London, 1857.

Wilson, W. S.
The Ocean as a Health Resort. London, 1880.

Winternitz, W.
'Hydrotherapie,' in Von Ziemssen's *Handbook of General Therapeutics.* English Translation by F. W. Elsner. London, 1886.
Zur Pathologie und Hydrotherapie der Lungenphthise. Leipzig and Vienna, 1887.

Wisard, A.
Traitement de l'Eczéma aux Eaux de Saint-Gervais. 1895.

Wolff, Felix.
Ueber den Einfluss des Gebirgsklimas. Wiesbaden, 1895.

,, and **Koeppe, H.**
'Ueber Blutuntersuchungen in Reiboldsgruen.' *Münchener med. Wochenschr.*, 1893, p. 209.

Wright, A. E.

'On the Treatment of Hæmorrhages and Urticarias, which are associated with Deficient Blood Coagulability.' *Lancet*, January 18, 1896.

'On the Association of Serous Hæmorrhages with Conditions of Defective Blood Coagulability.' *Lancet*, September 19, 1896.

Yeo, J. Burney.

Health Resorts and their Uses. London, 1882.

Climate and Health Resorts. Third Edition. London, 1890.

Ziemssen, H. von.

'Ueber die Behandlung der Lungentuberculose.' *Münchener med. Wochenschrift*, 1898, No. 1.

Aachen als Kurort, by Doctors Alexander, Beissel, Brandis, Goldstein, Mayer, Rademaker, Schumacher, and Thissen. Edited by Dr. J. Beissel. Aachen, 1889.

Baden-Baden und seine Kurmittel, by Doctors Baumgärtner, von Corval, A. Frey, von Hoffmann, Schliep, Schneider. Baden-Baden, 1886.

Oeynhausen und seine Indicationen, edited, for the fifty years Jubilee of the Spa, by Doctors Cohn, Huchzermeyer, Koch, Lehmann senior, Lehmann junior, Oetker, Reckmann, Rinteln, Rohden, Sauerwald, Voigt. Oeynhausen, 1895.

Fortschritte der Hydrotherapie. Festschrift zum vierzigjährigen Doctorjubiläum des Prof. Dr. W. Winternitz. Wien, 1897.

'A Report on the Open-Air Treatment of Phthisis in Sanatoria.' *British Medical Journal*, April and May 1898.

Articles by various writers in the 'Special Tuberculosis Number' of *The Practitioner*, 1898, vol. lx. No. 6.

'Sicily as a Health Resort.' *Lancet*, June, July, and August 1897.

Mediterranean Winter Resorts, with Special Articles by Resident English Physicians. Edited by E. A. Reynolds Ball. Second Edition. London, 1892.

The Climates and Baths of Great Britain. Being the Report of a Committee of the Royal Medical and Chirurgical Society of London. The contributions on the spas of Great Britain are by Doctors W. M. Ord, A. E. Garrod, F. Penrose, Robert Barnes, Frederick Roberts, and Mr. Malcolm Morris. London, 1895.

Congrès National d'Hygiène et de Climatologie Médicale de la Belgique et du Congo (1897). Brussels, 1898.

Deutsche Kurorte, edited by Dr. Oscar Lassar. Berlin, 1890.

Bäder-Almanach. Seventh Edition. Berlin, 1898.

Annuaire des Eaux Minérales. Paris, 1898.

B. Bradshaw's *Dictionary of Health Resorts, etc.* London, 1898.

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